

Sport Is Social Medicine: A Conceptual Review of Loneliness and Social Health

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SPORT IS SOCIAL MEDICINE: A CONCEPTUAL REVIEW OF LONELINESS AND SOCIAL HEALTH

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SPORT IS SOCIAL MEDICINE: A CONCEPTUAL REVIEW OF LONELINESS AND SOCIAL HEALTH

ABSTRACT

Background

Loneliness has emerged as a major public health challenge associated with adverse biological, psychological, and social outcomes. Although traditionally conceptualized as an individual psychological experience, contemporary perspectives increasingly emphasize social connection and social health as important determinants of well-being. Sport and physical activity have received growing attention as potential strategies for addressing loneliness; however, the mechanisms through which sport may influence loneliness and social health have not been clearly synthesized within a single conceptual framework. This review aimed to examine how sport participation may contribute to reducing loneliness through biological, psychological, and social pathways and to explore its potential role in promoting social health.

Methods

This study was conducted as a conceptual review using a narrative synthesis approach. Literature related to loneliness, social connection, social health, physical activity, sport participation, social prescribing, and relevant theoretical frameworks was reviewed across multiple disciplines. Evidence was examined and synthesized to identify the biological, psychological, and social mechanisms through which sport may influence loneliness and social health. Based on this synthesis, a conceptual model was developed to explain the relationships among sport participation, social connection, social health, and loneliness.

Results

The reviewed evidence suggests that sport participation may influence loneliness through interconnected biological, psychological, and social pathways. Biological mechanisms include improved stress regulation, reduced inflammation, and enhanced cognitive health. Psychological mechanisms involve greater self-efficacy, self-esteem, resilience, and well-being. Social mechanisms include strengthened social support, belongingness, social identity, and community participation. Building upon these findings, the Biopsychosocial Loop Model is proposed to explain how sport participation may strengthen social connection, promote social health, and reduce loneliness through mutually reinforcing processes. The review further introduces the Sport is Social Medicine (SSM) perspective, which conceptualizes sport as a social health resource that extends beyond its traditional role in physical and mental health promotion.

Conclusions

Current evidence suggests that the relationship between sport and loneliness cannot be explained through a single mechanism. Rather, sport appears to operate through interconnected biopsychosocial pathways that strengthen social connection and support social health. The proposed Biopsychosocial Loop Model and Sport is Social Medicine perspective provide complementary conceptual frameworks for understanding how sport may contribute to addressing loneliness and promoting social health across the lifespan. These frameworks may inform future research, public health strategies, and community-based interventions aimed at strengthening social connection and well-being.

Keywords: Loneliness; Social health; Social connection; Sport participation; Physical activity; Sport is Social Medicine

INTRODUCTION

Although human health has long been evaluated primarily through its physical and psychological dimensions, growing evidence in recent years has highlighted the critical role of social relationships as determinants of health. Strong social relationships have been associated with greater life satisfaction, better mental health, healthier behaviors, and increased longevity, whereas weak social ties and loneliness have been linked to a wide range of adverse health outcomes (Holt-Lunstad et al., 2010; Holt-Lunstad et al., 2015). These developments have demonstrated that health cannot be explained solely by the absence of disease or individual psychological well-being, but is also fundamentally shaped by individuals' relationships with their social environments. Accordingly, social health has received increasing attention as an important dimension of health, referring to an individual's capacity to establish and maintain meaningful social relationships, participate in community life, and engage in reciprocal interactions within social groups and communities (Mansfield et al., 2021; Dooris et al., 2022).

Within this context, loneliness has become a major topic of interest across the fields of health sciences, psychology, and public health. Loneliness is commonly defined as a subjective experience arising from a perceived discrepancy between desired and actual social relationships (Perlman & Peplau, 1981). In this regard, loneliness differs from social isolation, which refers to objective indicators such as the size of social networks or the frequency of social contact. An individual may have numerous social relationships yet still feel lonely, whereas another individual with relatively limited social interactions may not experience loneliness (Hawkley & Cacioppo, 2010). Therefore, loneliness cannot be understood simply as a lack of social contact; rather, it is a multidimensional phenomenon closely related to how individuals perceive and experience their social relationships.

One of the primary reasons loneliness has gained increasing attention is its broad impact on physical, psychological, and social health. Research has consistently demonstrated associations between loneliness and depression, anxiety, reduced life satisfaction, and psychological distress (Cacioppo & Hawkley, 2009; Mann et al., 2017). In addition, loneliness has been linked to cardiovascular disease, hypertension, impaired immune functioning, chronic inflammation, and increased risk of premature mortality (Holt-Lunstad et al., 2015; Ohiokpehai et al., 2025). More recent evidence further suggests that loneliness may contribute to cognitive decline, impaired healthy aging, and an elevated risk of dementia (Freak-Poli et al., 2022; Qiao et al., 2022; Guarnera et al., 2023; Mehrabi et al. 2024). Collectively, these findings indicate

that loneliness should be regarded not merely as an emotional experience but as a significant biopsychosocial risk factor with important health consequences.

The prevalence of loneliness further underscores its public health significance. Although loneliness has traditionally been viewed as a problem primarily affecting older adults, contemporary research indicates that it can occur across all stages of life. In particular, adolescents, young adults, and older individuals appear to be among the groups at greatest risk (Taylor et al., 2023). A recent report published by the World Health Organization Commission on Social Connection estimated that approximately one in six people worldwide experiences loneliness, identifying loneliness as a major global public health concern (WHO, 2025). Population aging, urbanization, digitalization, increasing numbers of single-person households, and broader societal transformations are widely recognized as factors contributing to the growing risk of loneliness (Mansfield et al., 2021).

Recent years have witnessed an important conceptual shift in loneliness research. Whereas earlier studies primarily focused on the causes and reduction of loneliness, contemporary approaches increasingly emphasize social connection, belongingness, and social health as central constructs for understanding loneliness (Dooris et al., 2022; WHO, 2025). Within this perspective, loneliness is viewed as an important indicator of deficiencies in social connection. Social connection encompasses the presence, quality, continuity, reciprocity, and supportive nature of interpersonal relationships, as well as individuals' sense of belonging to social groups and communities (Mansfield et al., 2021; Warren, 2026). This perspective has also reshaped intervention strategies aimed at addressing loneliness. Rather than focusing exclusively on reducing loneliness itself, current public health approaches increasingly prioritize strengthening social connections, fostering community belonging, and promoting social participation (Dooris et al., 2022; WHO, 2025).

Within the field of physical activity and sport, one of the most influential public health paradigms in recent decades has been the "Exercise is Medicine" initiative (Sallis, 2009; Lobelo et al., 2014; Thompson et al., 2020; Sjøgaard et al., 2016; Khan et al., 2025; Berg et al., 2026; Bricca et al., 2026). This approach emphasizes the role of regular physical activity in the prevention and management of chronic diseases and positions exercise as a fundamental component of healthcare. Subsequent research has demonstrated that exercise and sport provide benefits extending beyond physical health, contributing positively to outcomes such as depression, anxiety, psychological well-being, and life satisfaction. However, the potential contribution of sport to social health has received considerably less conceptual and empirical

attention than its physical and psychological benefits (Eime et al., 2013; Jenkin et al., 2017). Yet sport represents a unique behavioral intervention capable of simultaneously fostering social interaction, social support, group belonging, community participation, and social identity development. In particular, team sports, group-based exercise programs, and community-based physical activity initiatives provide regular opportunities for social engagement, facilitate the development of belongingness, strengthen social support networks, and promote community integration (Eime et al., 2013; Jenkin et al., 2017; Khan & Bolina, 2020; Shvedko et al., 2020; Hansen et al., 2024; Martins et al., 2025; Rivera et al., 2026). Consequently, sport may be viewed not only as a physical or psychological health behavior but also as a potential public health resource capable of enhancing social health.

Despite growing interest in this area, an important conceptual gap remains. Although the number of studies examining the relationship between sport participation and loneliness has increased substantially, most investigations have focused primarily on documenting associations between these variables. As a result, the biological, psychological, and social pathways through which sport may influence loneliness have not yet been sufficiently explained within a clear theoretical framework (Vancampfort et al., 2019; Rangul et al., 2024; Gu et al., 2024; Liang et al., 2025). Moreover, as contemporary loneliness research increasingly emphasizes social connection and social health, the role of sport as a means of supporting social health has received relatively limited conceptual attention. This situation points to the need for a framework that explains how sport may contribute to reducing loneliness while also strengthening social connections and supporting social health through biological, psychological, and social processes.

Accordingly, this conceptual review draws on evidence from the sport, loneliness, social connection, and social health literatures to advance understanding of the role of sport in addressing loneliness. Rather than simply summarizing existing findings, the present paper reconceptualizes sport as a social health resource that operates through biological, psychological, and social pathways. Building on contemporary perspectives of social connection and social health, we propose the Sport is Social Medicine (SSM) perspective, which conceptualizes sport as a potential public health resource capable of strengthening belongingness, fostering meaningful social relationships, encouraging social participation, and supporting social well-being across the lifespan. To provide a theoretical foundation for this perspective, we propose the Biopsychosocial Loop Model, which explains how reciprocal biological, psychological, and social processes may contribute to reduced loneliness and

enhanced social health. By extending the traditional “Exercise is Medicine” paradigm beyond physical and psychological outcomes, this perspective highlights the potential of sport to function not only as medicine for the body and mind, but also as a valuable resource for social health.

METHODS

Study Design

This study was conducted as a conceptual review using a narrative synthesis approach to examine and integrate contemporary evidence on loneliness, social connection, social health, and sport participation. The review aimed to explore the biological, psychological, and social mechanisms through which sport may contribute to strengthening social connection and promoting social health. The review was designed to evaluate and interpret evidence from the fields of sport, loneliness, social connection, and social health and to develop a theoretical perspective regarding the potential role of sport in promoting social well-being.

Rather than adopting a systematic review or meta-analytic approach, the study employed a narrative synthesis strategy to examine findings from multiple areas of research and to identify the pathways through which sport may influence loneliness and social health. Contemporary evidence related to loneliness, social isolation, social connection, social health, physical activity, and sport participation was reviewed from a biopsychosocial perspective.

In addition to examining existing evidence, the review sought to develop a theoretical framework explaining how sport may contribute to reduced loneliness and enhanced social health. Given the conceptual and theory-building objectives of the present review, a formal systematic review protocol was not adopted and PRISMA reporting guidelines were not applied.

Literature Search Strategy

Relevant literature was identified through searches of major electronic databases, including PubMed, Scopus, Web of Science, and Google Scholar. Searches were conducted between January and May 2026 and focused on combinations of keywords related to loneliness, social isolation, social connection, social health, sport participation, physical activity, exercise, belongingness, and social prescribing. Priority was given to peer-reviewed empirical studies, systematic reviews, meta-analyses, theoretical papers, and reports from international organizations published in English. Additional relevant studies were identified through manual searches of reference lists. Because the purpose of the review was conceptual synthesis and theory development, study selection was guided by relevance to the review objectives rather than predefined systematic review criteria.

Data Analysis and Development of the Biopsychosocial Loop Model

The literature reviewed in this study was examined through an iterative narrative synthesis process. Relevant publications addressing loneliness, social connection, social health,

physical activity, and sport participation were evaluated with particular attention to their conceptual and empirical contributions to understanding the relationship between sport and loneliness.

The reviewed evidence was analyzed to identify recurring themes and mechanisms linking sport participation with loneliness-related outcomes. Particular emphasis was placed on biological, psychological, and social processes described within the literature. These themes were subsequently organized into three overarching categories: biological mechanisms, psychological mechanisms, and social mechanisms.

The findings were then interpreted within a biopsychosocial perspective to explore how these mechanisms may interact to influence loneliness, social connection, and social health. Drawing upon contemporary theories of social connection, social health frameworks, and the biopsychosocial model, the identified themes were integrated into a unified conceptual framework.

This interpretive synthesis informed the development of the **Biopsychosocial Loop Model** proposed in the present review. The model was developed as a conceptual framework integrating evidence from the sport, loneliness, social connection, and social health literatures to explain how sport participation may contribute to reduced loneliness and enhanced social health through interconnected biological, psychological, and social pathways.

Ethical Statement

Ethics approval and consent to participate;

Not applicable. This study was a conceptual review based exclusively on previously published literature and did not involve human participants, animals, or primary data collection.

CONCEPTUAL AND THEORETICAL FRAMEWORK

Conceptualizing Loneliness: Traditional and Contemporary Perspectives

Loneliness is a multidimensional construct that has been extensively studied across psychology, sociology, gerontology, and public health. While early research primarily viewed loneliness as an individual and subjective emotional experience, contemporary scholarship increasingly recognizes it as a complex public health issue with significant implications for physical health, mental health, cognitive functioning, and longevity (Hawkley & Cacioppo, 2010; Holt-Lunstad et al., 2015). This shift has highlighted that loneliness cannot be reduced solely to an individual's internal experiences but should instead be understood as a multidimensional phenomenon shaped by interactions among social relationships, environmental conditions, and broader societal processes. Defined as a perceived discrepancy between desired and actual social relationships (Perlman & Peplau, 1981), loneliness is now frequently examined within biopsychosocial frameworks (Cacioppo & Hawkley, 2009) and

social health perspectives (WHO, 2025), emphasizing the quality and sustainability of social connections.

One of the most widely accepted definitions of loneliness was proposed by Perlman and Peplau (1981), who described loneliness as an unpleasant and subjective experience arising from a discrepancy between an individual's desired and existing social relationships. Accordingly, loneliness cannot be equated directly with limited social contact or small social networks. Some individuals may experience loneliness despite being embedded within extensive social networks, whereas others may feel socially fulfilled despite having relatively few social relationships (Hawkley & Cacioppo, 2010). Consequently, loneliness is determined less by objective social circumstances than by how individuals perceive and evaluate their social relationships.

Scientific interest in loneliness accelerated during the second half of the twentieth century. Although early studies largely conceptualized loneliness as an individual psychological experience, subsequent research increasingly emphasized the importance of relationship quality, social support systems, and social participation in shaping loneliness experiences. During this period, loneliness came to be recognized as a multidimensional phenomenon resulting from the failure to satisfy different social needs (Weiss, 1973). One of the most influential theoretical contributions to the field was Weiss's (1973) distinction between emotional loneliness and social loneliness. This framework demonstrated that loneliness is influenced not only by the quantity of social relationships but also by factors such as intimacy, belongingness, trust, and social attachment. Subsequent empirical studies have supported this distinction and demonstrated that loneliness may vary across age groups and social contexts (de Jong Gierveld & van Tilburg, 2006).

In recent decades, the biopsychosocial perspective has further advanced understanding of loneliness by highlighting its multidimensional nature. From this perspective, loneliness is not merely a cognitive or emotional perception but is also associated with biological processes, including neuroendocrine functioning, immune regulation, stress responses, and health-related behaviors (Cacioppo & Hawkley, 2009; Hawkley & Cacioppo, 2010). A growing body of evidence indicates that loneliness is associated not only with psychological outcomes such as depression, anxiety, and reduced life satisfaction, but also with cardiovascular disease, cognitive decline, and increased risk of premature mortality (Holt-Lunstad et al., 2015; Freak-Poli et al., 2022). These findings have contributed to the recognition of loneliness as a systemic risk factor with broad health implications rather than merely an individual emotional state.

More recently, loneliness has increasingly been examined through the lenses of social connection and social health (Mansfield et al., 2021; Dooris et al., 2022; WHO, 2025). Within this perspective, loneliness is viewed not simply as an individual deficit but as an important indicator of the quality and adequacy of individuals' social relationships and connections. As a result, the theoretical focus has gradually shifted from reducing loneliness directly toward strengthening belongingness, social support, community participation, and broader forms of social integration. This emerging perspective aligns with contemporary public health approaches that prioritize the promotion of social connection and social health as pathways for addressing loneliness at both individual and population levels.

Taken together, current evidence suggests that loneliness should be understood as a complex public health challenge encompassing biological, psychological, and social dimensions. The diverse forms through which loneliness may manifest and the variety of social needs to which it is related underscore the importance of adopting a multidimensional perspective. Accordingly, examining both the emotional and social dimensions of loneliness may contribute to a more comprehensive understanding of its underlying mechanisms and inform the development of more effective intervention strategies. Accordingly, contemporary perspectives on loneliness provide an important foundation for examining how sport may contribute to social connection, social health, and the reduction of loneliness.

- ***Emotional and Social Loneliness***

The diversity of social needs underlying loneliness has led researchers to examine the construct through multiple dimensions. In this regard, Weiss's (1973) distinction between emotional and social loneliness remains one of the most influential theoretical frameworks in loneliness research. This model suggests that loneliness is shaped not only by deficiencies in the number of social relationships but also by the quality of social bonds and the extent to which individuals' needs for attachment and belonging are fulfilled. Accordingly, loneliness can be understood through two related yet conceptually distinct dimensions.

Emotional loneliness arises when individuals are unable to satisfy their needs for intimacy, trust, affection, and psychological support (Weiss, 1973). Contemporary research indicates that the quality of social relationships, rather than the size of one's social network, plays a central role in the development of emotional loneliness. Relationship satisfaction, perceived social support, and interpersonal closeness appear to be more important predictors of loneliness than the number of social contacts an individual possesses (Schrempft et al., 2019; Lim et al., 2020; Luchetti et al., 2024; Ohiokpehai et al., 2025). Consequently, individuals may experience

emotional loneliness even when surrounded by extensive social networks if they perceive their relationships as insufficient to meet their psychological needs. In particular, a lack of trust-based intimacy, low perceived social support, and attachment-related difficulties have been identified as major risk factors (Cacioppo & Patrick, 2008). These findings suggest that emotional loneliness is largely a subjective experience shaped by individuals' perceptions and evaluations of their social relationships.

In contrast, social loneliness occurs when individuals do not perceive themselves as meaningful members of a group, network, or community (Weiss, 1973). Unlike emotional loneliness, which is primarily associated with deficits in close interpersonal relationships, social loneliness reflects unmet needs for social integration, group affiliation, and belongingness (Baumeister & Leary, 1995). Individuals experiencing social loneliness often report more limited social networks, fewer opportunities for participation, and weaker feelings of belonging (de Jong Gierveld & van Tilburg, 2006; Hawkey & Cacioppo, 2010). However, social loneliness may also occur among individuals who maintain strong family relationships but have limited involvement in collective activities, community life, or broader social networks. This distinction highlights that emotional and social loneliness originate from different social sources and may require different approaches for prevention and intervention.

Recent evidence suggests that social loneliness is particularly prevalent among older adults, individuals living alone, migrants, and populations with limited access to opportunities for social participation (Pollak et al., 2025; Ohiokpehai et al., 2025). Furthermore, broader societal processes—including urbanization, changes in communication technologies, transformations in working life, and the weakening of traditional social structures—have been identified as factors that may contribute to increasing levels of social loneliness. Contemporary social connection perspectives further emphasize that social loneliness cannot be explained solely by the frequency of social contact. Rather, individuals' perceptions of being socially connected, accepted, valued, and integrated within a community are equally important determinants of loneliness experiences (Mansfield et al., 2021; WHO, 2025).

From this perspective, social loneliness is increasingly regarded as an important indicator of social health. Consequently, interventions aimed at reducing social loneliness should focus not only on increasing opportunities for social interaction but also on creating environments that foster belongingness, meaningful participation, and sustained social engagement. Such approaches are consistent with contemporary public health strategies that prioritize

strengthening social connections and promoting social health as pathways for addressing loneliness.

- ***Loneliness from the Perspectives of Social Connection, Social Isolation, and Social Health***

Loneliness research has undergone a significant theoretical evolution in recent years. Although Weiss's (1973) distinction between emotional and social loneliness continues to provide an important conceptual foundation, contemporary scholarship increasingly emphasizes that loneliness is shaped not only by interpersonal relationships but also by the quality of social connections, feelings of belonging, and opportunities for social participation. Individuals' identities, sense of belonging, life circumstances, and broader social environments all play important roles in shaping loneliness experiences (de Jong Gierveld et al., 2018; Mansfield et al., 2021). Consequently, loneliness is now widely understood as the product of dynamic interactions between individual characteristics and social contexts.

This shift has been influenced by theoretical perspectives that emphasize the importance of group membership and social identity for well-being. The Social Identity Approach (Turner et al., 1987) proposes that individuals derive a sense of self, belonging, and meaning from their membership in social groups. Building on this foundation, the Social Cure perspective argues that group memberships can serve protective functions by providing social support, shared identity, and social connectedness, thereby promoting health and well-being (Haslam et al., 2016). From this perspective, belonging to valued social groups can buffer individuals against loneliness, whereas social exclusion, weakened group memberships, and diminished feelings of belonging may increase vulnerability to loneliness.

These theoretical developments have also contributed to a clearer distinction among loneliness, social isolation, and social connection. Loneliness refers to the subjective experience that arises when individuals perceive a discrepancy between their desired and actual social relationships (Perlman & Peplau, 1981). In contrast, social isolation is generally understood as an objective condition characterized by limited social networks, infrequent social contact, or low levels of social interaction. As a result, socially active individuals may still experience loneliness, whereas some individuals with relatively restricted social networks may not perceive themselves as lonely (Holt-Lunstad et al., 2015; Luchetti et al., 2024; Ohiokpehai et al., 2025).

The concept of social connection has emerged as a broader framework for understanding these distinctions. Social connection encompasses not only the existence of social relationships

but also their quality, continuity, reciprocity, and the sense of belonging that arises from them (Mansfield et al., 2021; WHO, 2025). Contemporary approaches increasingly view loneliness, social isolation, and social connection not as independent constructs but as interconnected dimensions of a broader social system. Accordingly, the health implications of social relationships depend not only on the size of an individual's social network but also on the extent to which they feel accepted, supported, valued, and connected within that network (Dooris et al., 2022; WHO, 2025).

Evidence regarding the health benefits of social connection continues to accumulate. Strong interpersonal relationships have been associated with greater life satisfaction, lower risk of depression, better physical health outcomes, and increased longevity (Holt-Lunstad et al., 2010; Holt-Lunstad et al., 2015). Conversely, loneliness and social isolation have been linked to cardiovascular disease, cognitive decline, mental health difficulties, and increased risk of premature mortality (Freak-Poli et al., 2022; Ohiokpehai et al., 2025). Furthermore, social connections appear to play an important role in preserving cognitive functioning and supporting healthy aging throughout the lifespan (Schrepft et al., 2019; Guarnera et al., 2023).

In light of these findings, loneliness is increasingly being examined within the broader framework of social health. Social health refers to an individual's capacity to establish and maintain meaningful relationships, participate in collective networks, engage in community life, and develop a sense of belonging (Dooris et al., 2022). From this perspective, loneliness is not merely an internal psychological experience but also an important indicator of the quality of an individual's social relationships and social integration. Consequently, contemporary approaches focus less on reducing loneliness directly and more on strengthening social connections, fostering community belonging, and expanding opportunities for meaningful social participation (Mansfield et al., 2021; WHO, 2025).

This conceptual shift provides an important theoretical foundation for understanding the potential role of sport in addressing loneliness. Sport settings offer opportunities for social interaction, group membership, shared goals, and the development of belongingness, all of which can strengthen social connections. Consequently, sport may be viewed not only as an individual health behavior but also as a potential social health intervention capable of strengthening social connection and supporting social health.

- ***Loneliness as a Contemporary Public Health Challenge***

Loneliness is increasingly recognized not merely as an individual experience but as a major global public health challenge. This shift has been driven by growing evidence regarding

both the widespread prevalence of loneliness and its detrimental effects on health across the lifespan. Recent research indicates that loneliness can occur at all stages of life, from childhood to older adulthood, with adolescents, young adults, and older individuals often identified as particularly vulnerable groups (Taylor et al., 2023). According to the World Health Organization Commission on Social Connection, approximately one in six people worldwide experiences loneliness, highlighting its significance as a global public health concern that negatively affects quality of life, increases healthcare utilization, and contributes to the burden of chronic disease (Solmi et al., 2020; WHO, 2025).

The public health relevance of loneliness extends beyond its prevalence to its broad range of health consequences. Evidence consistently demonstrates associations between loneliness and depression, anxiety, cardiovascular disease, hypertension, and increased risk of premature mortality (Perissinotto et al., 2012; Holt-Lunstad et al., 2015). In addition, inadequate social connections have been linked to cognitive decline, impaired healthy aging, and an elevated risk of dementia (Freak-Poli et al., 2022; Qiao et al., 2022; Guarnera et al., 2023). Collectively, these findings support the view that loneliness represents a significant biopsychosocial risk factor with far-reaching health implications. Moreover, its consequences extend beyond the individual level, contributing to increased healthcare demands, reduced workforce productivity, lower life satisfaction, diminished social participation, and weakened social capital within communities (WHO, 2025; Ohiokpehai et al., 2025).

For these reasons, loneliness is increasingly regarded as an important social determinant of health that influences both population well-being and broader societal development. The growing recognition of loneliness as a public health challenge has intensified calls for multidimensional strategies that address its biological, psychological, and social determinants simultaneously (WHO, 2025; Blodgett et al., 2025; Zorotovich & Reeder, 2026). Within this context, sport has emerged as a promising public health resource that may contribute not only to physical and psychological well-being but also to social health through its capacity to strengthen social connections, foster belongingness, and support community participation.

Discussion

The multidimensional nature of loneliness requires consideration of the biological, psychological, and social processes involved in its development and maintenance. In recent years, approaches focused solely on increasing the frequency of social contact have increasingly been replaced by more comprehensive frameworks that simultaneously address social relationships, psychological resources, and health-related biological mechanisms (Mansfield et

al., 2021; WHO, 2025). Within this context, sport and physical activity have emerged as strategic intervention domains because they have the potential to influence multiple pathways simultaneously. Therefore, understanding the potential role of sport in addressing loneliness requires consideration of the biological, psychological, and social pathways through which sport participation may influence social connection and social health.

Biological Pathways Linking Sport Participation and Loneliness

Loneliness is increasingly recognized not only as a subjective psychological experience but also as a multidimensional health condition associated with a range of biological processes. A growing body of evidence indicates that loneliness is linked to chronic low-grade inflammation, neuroendocrine dysregulation, impaired immune functioning, increased cardiometabolic risk, and elevated risk of premature mortality (Holt-Lunstad et al., 2015; Qiao et al., 2022; Luchetti et al., 2024). These findings suggest that the consequences of loneliness extend beyond social and psychological domains, affecting physiological systems that are fundamental to long-term health.

Regular physical activity and sport participation have been widely recognized as effective behavioral strategies for reducing many of the biological risks associated with chronic disease. More recently, researchers have suggested that these protective effects may also counteract some of the physiological consequences linked to loneliness (Lobelo et al., 2014; Thompson et al., 2020). Overall, the biological benefits of sport appear to operate through several interconnected pathways, including the regulation of inflammation, the modulation of stress responses, the promotion of neuroplasticity, and improvements in cardiometabolic health.

One of the most frequently cited biological mechanisms linking loneliness to adverse health outcomes is chronic inflammation. Individuals experiencing higher levels of loneliness have been reported to exhibit elevated concentrations of inflammatory biomarkers such as C-reactive protein (CRP), interleukin-6 (IL-6), and tumor necrosis factor-alpha (TNF- α) (Luchetti et al., 2024; Ohiokpehai et al., 2025). Regular physical activity has been shown to reduce systemic inflammation, enhance anti-inflammatory processes, and support immune functioning (Pedersen & Saltin, 2015). Through these mechanisms, sport participation may help mitigate some of the physiological burden associated with chronic loneliness.

Loneliness and social isolation have also been associated with prolonged activation of stress-response systems, particularly dysregulation of the hypothalamic–pituitary–adrenal (HPA) axis and autonomic nervous system functioning (Cacioppo & Patrick, 2008). Chronic activation of these systems may contribute to adverse physical and mental health outcomes over

time. Regular exercise has been shown to improve autonomic regulation, moderate physiological stress responses, and facilitate recovery following exposure to stressors (Thompson et al., 2020). These effects may represent an additional pathway through which sport contributes to resilience against the biological consequences of loneliness.

Beyond inflammation and stress regulation, loneliness has been linked to cognitive decline and an increased risk of dementia (Freak-Poli et al., 2022; Guarnera et al., 2023). Physical activity has been associated with enhanced neuroplasticity, increased levels of brain-derived neurotrophic factor (BDNF), improved cardiorespiratory fitness, and better metabolic health (Pedersen & Saltin, 2015; Thompson et al., 2020). These physiological adaptations are believed to support cognitive functioning and healthy aging, potentially offsetting some of the neurological risks associated with chronic loneliness.

Taken together, current evidence suggests that sport participation may influence loneliness-related health outcomes through multiple biological pathways. Although physical activity may not directly eliminate loneliness itself, it appears capable of reducing biological stress burden, supporting cognitive health, improving physiological functioning, and enhancing overall health outcomes. These biological effects provide an important foundation for understanding how sport may contribute to reducing the broader health consequences of loneliness.

Psychological Pathways Linking Sport Participation and Loneliness

Loneliness is fundamentally a subjective experience shaped by how individuals perceive and evaluate their social relationships. Consequently, individuals exposed to similar social environments may experience markedly different levels of loneliness. This observation suggests that loneliness is influenced not only by objective social circumstances but also by cognitive, emotional, and motivational processes. Within this context, sport and physical activity may play an important role in reducing loneliness by strengthening psychological resources that support adaptation, well-being, and social engagement.

A substantial body of evidence indicates that regular participation in physical activity is associated with reduced depressive symptoms, greater life satisfaction, more positive affect, and improved psychological well-being (McAuley et al., 2000; Downward & Rasciute, 2011; Lubans et al., 2016; Biddle et al., 2019; Gu et al., 2024; Liang et al., 2025). These psychological benefits may help alleviate negative emotional states commonly associated with loneliness while encouraging a more positive orientation toward social participation and interpersonal relationships.

One of the principal psychological mechanisms through which sport may influence loneliness involves the development of self-efficacy and positive self-perceptions. Self-efficacy refers to an individual's belief in their ability to successfully perform specific behaviors and manage challenging situations (Bandura, 1997). Achievement experiences gained through sport and physical activity can strengthen confidence, reduce apprehension regarding social participation, and foster more adaptive expectations about social interactions. Similarly, sport participation has been shown to enhance self-esteem and perceptions of self-worth, enabling individuals to feel more competent, valued, and socially accepted (Fox, 1999; McAuley et al., 2000; Lubans et al., 2016). These psychological resources may be particularly important in reducing vulnerability to loneliness by promoting greater confidence in social situations and facilitating engagement with others.

Psychological resilience represents another important pathway linking sport participation to reduced loneliness. Resilience refers to the capacity to adapt successfully to adversity and recover from stressful experiences. The physical and psychological challenges encountered during sport participation provide opportunities to develop coping skills, emotional regulation, and adaptive responses to stress. Through these experiences, individuals may become better equipped to manage negative emotions and navigate social difficulties, thereby reducing the likelihood that feelings of loneliness become persistent or overwhelming (Gu et al., 2024; Luchetti et al., 2024).

The psychological benefits of sport can also be understood through the lens of Self-Determination Theory. According to this framework, psychological well-being is supported when the fundamental needs for autonomy, competence, and relatedness are satisfied (Deci & Ryan, 2000). Sport settings frequently provide opportunities for individuals to experience personal choice, develop competence through skill acquisition, and establish meaningful relationships with others. By fulfilling these basic psychological needs, sport may enhance well-being and contribute to reductions in loneliness (Figure 1).

Furthermore, group-based sport and physical activity contexts often involve cooperation, shared goals, and repeated social interactions. These experiences may strengthen perceptions of social competence and interpersonal confidence, facilitating the formation and maintenance of positive relationships. Taken together, current evidence suggests that sport may reduce loneliness by enhancing self-efficacy, self-esteem, resilience, and psychological well-being. However, these psychological benefits are often reinforced through increased social participation and the development of meaningful social relationships. Therefore, a

comprehensive understanding of the relationship between sport and loneliness also requires consideration of the social mechanisms through which sport promotes connection and belonging.

Social Pathways Linking Sport Participation and Loneliness

Contemporary explanations of loneliness increasingly emphasize the importance of social connection, belongingness, and social participation. Recent social health frameworks suggest that loneliness should be understood not merely as an individual experience but also as an important indicator of the quality of an individual's social relationships and level of social integration (Mansfield et al., 2021; Dooris et al., 2022; WHO, 2025). From this perspective, sport represents a particularly valuable context for strengthening social connections and promoting social health.

Sport settings provide regular opportunities for interpersonal interaction and facilitate the development of new social relationships (Eime et al., 2013; Jenkin et al., 2017; Jackman et al., 2026). Team sports, group exercise programs, walking groups, and community-based physical activity initiatives bring individuals together around shared goals and collective experiences. These environments may expand social networks while simultaneously supporting the maintenance and strengthening of existing relationships (Vancampfort et al., 2019; Rangul et al., 2024; Steinhoff & Reiner, 2024). By creating opportunities for repeated social contact and meaningful interaction, sport may help address one of the central social conditions associated with loneliness.

A closely related mechanism involves social support, which is widely recognized as an important protective factor against loneliness. Social relationships developed through sport may provide emotional support, informational resources, practical assistance, and opportunities for reciprocal exchange. Strong social support networks have consistently been associated with lower levels of loneliness, better mental health outcomes, and more resilient social connections (Gu et al., 2024; Hansen et al., 2024; Liang et al., 2025; Steinhoff & Reiner, 2024). Consequently, sport participation may contribute to loneliness reduction by fostering supportive interpersonal environments that enhance both perceived and received social support.

The social benefits of sport can also be interpreted through the Social Identity Approach and the Social Cure perspective. These frameworks propose that group memberships provide individuals with meaningful social identities, a sense of belonging, and access to social resources that support health and well-being (Haslam et al., 2016). Sport clubs, teams, and organized exercise groups offer opportunities for individuals to perceive themselves as valued

members of a collective, thereby strengthening group identification and belongingness. Such experiences may be particularly important in reducing loneliness because they address fundamental human needs for social inclusion and social connectedness (WHO, 2025).

Beyond interpersonal relationships and group identity, sport may also promote broader forms of social participation and community engagement. Participation in sport encourages individuals to interact with others, become involved in community activities, and establish connections that extend beyond the immediate sporting environment. Through these processes, sport may contribute to the development of social capital and strengthen ties within communities (Rivera et al., 2026). These outcomes suggest that the benefits of sport extend beyond individual-level health effects and may generate broader social benefits at the community level.

Taken together, the social pathways linking sport participation and loneliness appear to operate through multiple interconnected mechanisms, including the expansion of social networks, the provision of social support, the development of social identity, the enhancement of belongingness, and the promotion of social participation. These mechanisms not only contribute to reductions in loneliness but also support the broader goals of social health. Accordingly, sport may be viewed not simply as a form of physical activity, but as a meaningful public health resource capable of strengthening social connection, fostering belonging, and promoting social health across diverse populations (Figure 1).

Interaction of Biopsychosocial Mechanisms: The Biopsychosocial Loop Model

Although the effects of sport participation on loneliness may operate through biological, psychological, and social pathways, these mechanisms should not be viewed as independent processes. According to the biopsychosocial model, health outcomes emerge through the dynamic interaction of biological, psychological, and social factors (Engel, 1977; Borrell-Carrio et al., 2004). Building upon this perspective, the present review proposes the **Biopsychosocial Loop Model (Figure 1)** as an integrative conceptual framework for understanding how sport participation may contribute to reduced loneliness.

The model suggests that sport participation simultaneously influences biological, psychological, and social mechanisms that strengthen social connection and promote social health. These interconnected processes may contribute to reductions in loneliness while also generating positive health and well-being outcomes. Importantly, improvements in social connection, belongingness, psychological well-being, and overall health may increase the likelihood of continued participation in sport and social activities. As a result, the benefits associated with sport participation may reinforce one another over time, creating a potentially sustainable feedback loop.

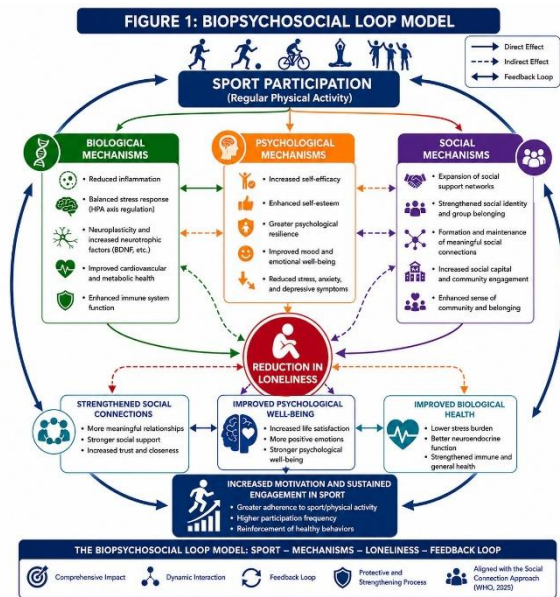


Figure 1. Biopsychosocial Loop Model. The model illustrates the proposed dynamic pathways through which sport participation may influence loneliness via interacting biological, psychological, and social mechanisms, with feedback processes supporting continued sport engagement.

Table 1. Conceptual Components of the Proposed Biopsychosocial Loop Model Linking Sport Participation and Loneliness

Model Component	Core Description	Relevance to Loneliness	Function Within the Model	Representative Literature
Sport Participation	Regular engagement in sport and physical activity	Serves as the starting point of the proposed process	Input	Eime et al., 2013; Jenkin et al., 2017; Rangul et al., 2024; Liang et al., 2025; Jackman et al., 2026
Biological Mechanisms	Reduced inflammation, regulation of stress responses, enhanced neuroplasticity, and improved cardiometabolic health	May reduce the biological burden associated with loneliness	Biological pathway	Pedersen & Saltin, 2015; Thompson et al., 2020; Luchetti et al., 2024
Psychological Mechanisms	Self-efficacy, self-esteem, resilience, and psychological well-being	May reduce perceived loneliness and social withdrawal	Psychological pathway	Bandura, 1997; Deci & Ryan, 2000; McAuley et al., 2000; Lubans et al., 2016; Gu et al., 2024; Liang et al., 2025
Social Mechanisms	Social support, social identity, belongingness, and social participation	Facilitate the development and maintenance of social relationships	Social pathway	Haslam et al., 2016; Mansfield et al., 2021; Gu et al., 2024; Rangul et al., 2024; Rivera et al., 2026; Steinhoff & Reiner, 2024; Jackman et al., 2026

Social Connection	Meaningful relationships, belongingness, and supportive social networks	One of the most proximal protective factors against loneliness	Central mediating mechanism	WHO, 2025; Luchetti et al., 2024; Steinhoff & Reiner, 2024; Jackman et al., 2026
Social Health	Social functioning, social participation, belongingness, and social integration	Represents positive social well-being beyond the absence of loneliness	Primary health outcome	Dooris et al., 2022; WHO, 2025; Warren, 2026
Reduced Loneliness	Decreased subjective experience of loneliness	Principal outcome of the proposed model	Primary outcome	Holt-Lunstad et al., 2015; Vancampfort et al., 2019; Shvedko et al., 2020; Rangul et al., 2024; Gu et al., 2024; Ohiokpehai et al., 2025; Jackman et al., 2026
Biopsychosocial Feedback Loop	Reduced loneliness reinforces continued sport participation, psychological well-being, and social engagement	Supports the sustainability of positive outcomes over time	Distinguishing feature of the model	Engel, 1977; Borrell-Carrio et al., 2004; Hansen et al., 2024; Blodgett et al., 2025

According to the proposed model, sport participation strengthens social connection through interconnected biological, psychological, and social mechanisms (Figure 1). Enhanced social connection may contribute to reductions in loneliness by facilitating the development of meaningful relationships, expanding social support networks, and fostering a stronger sense of belonging. At the same time, these processes may promote broader aspects of social health, including social functioning, community participation, and social integration. Within the model, **social connection** is positioned as the central mediating mechanism linking sport participation to reduced loneliness, whereas **social health** represents a broader health outcome encompassing an individual's capacity to establish meaningful relationships, participate in social life, develop a sense of belonging, and maintain social roles (Dooris et al., 2022; WHO, 2025). Consequently, although reducing loneliness is considered an important outcome, the model conceptualizes the promotion of social health as a broader public health objective.

A distinguishing feature of the proposed model is its conceptualization of reduced loneliness not only as an outcome but also as a mechanism that reinforces the continuation of the process (Figure 1). As loneliness decreases, individuals may become more willing to engage in social activities, develop stronger interpersonal relationships, and maintain participation in sport and physical activity. Continued participation may, in turn, preserve and strengthen biological, psychological, and social benefits, thereby reinforcing the cyclical relationships among sport participation, social connection, social health, and loneliness. In this way, the

model proposes a dynamic and potentially sustainable feedback process in which positive outcomes contribute to the maintenance of the conditions that produced them.

Accordingly, the proposed **Biopsychosocial Loop Model** extends beyond explanations that attribute the effects of sport on loneliness solely to the health benefits of physical activity. Instead, it conceptualizes sport as a multidimensional intervention capable of strengthening social connection and promoting social health. In this respect, the model provides the theoretical foundation for the **Sport is Social Medicine (SSM)** perspective proposed in the present review.

Contemporary theories and social connection frameworks increasingly emphasize that loneliness should not be understood solely as an individual problem arising from insufficient interpersonal relationships (Mansfield et al., 2021; WHO, 2025). Consistent with this perspective, the proposed Biopsychosocial Loop Model should be regarded as a conceptual framework developed through the integration of existing evidence rather than as an empirically tested model. Future process-oriented, experimental, and intervention-based studies are needed to evaluate the relationships proposed within the model and to further clarify the role of sport in reducing loneliness and promoting social health.

Sport Is Social Medicine (SSM): Reframing Sport as a Social Health Intervention

The Biopsychosocial Loop Model presented in the previous section (Figure 1 and Table 1) suggests that the effects of sport participation on loneliness emerge through the interaction of biological, psychological, and social mechanisms. Importantly, the model indicates that the benefits of sport extend beyond the reduction of loneliness itself and may contribute to broader outcomes related to social connection, belongingness, and social health. From this perspective, sport may be understood not merely as a physical fitness behavior but as a multidimensional public health resource capable of supporting well-being across multiple domains.

The growing recognition of social health has contributed to a broader understanding of health and well-being. Contemporary perspectives increasingly acknowledge that health cannot be fully understood without considering the quality of individuals' social relationships and their capacity to participate in social life. Social health refers to the ability to establish and maintain meaningful relationships, participate in social networks and community life, develop a sense of belonging, and fulfill social roles (Dooris et al., 2022; WHO, 2025; Warren, 2026). Rather than simply representing the absence of loneliness or social isolation, social health reflects positive social functioning, social integration, and social well-being.

The importance of social health is supported by extensive evidence demonstrating that strong social connections are associated with greater life satisfaction, better mental health,

healthier behaviors, and lower mortality risk (Holt-Lunstad et al., 2010; Holt-Lunstad et al., 2015). Conversely, loneliness and social isolation have been linked to a wide range of adverse physical, psychological, and social outcomes. Consequently, social connection is increasingly recognized as a fundamental social determinant of health, and contemporary public health strategies have begun to prioritize the promotion of meaningful relationships, belongingness, and community participation as key objectives (WHO, 2025).

Within this context, sport represents a particularly promising vehicle for promoting social health. Beyond its well-established physical and psychological benefits, sport provides structured opportunities for social interaction, social support, group membership, and community engagement (Eime et al., 2013; Haslam et al., 2016; Mansfield et al., 2021; Steinhoff & Reiner, 2024; Jackman et al., 2026). Team sports, sport clubs, walking groups, and community-based physical activity programs bring individuals together around shared goals and collective experiences, creating environments in which social relationships and belongingness can develop. These social processes are increasingly recognized as important pathways through which sport may contribute to reduced loneliness and improved social health.

Viewed through the lens of the proposed Biopsychosocial Loop Model, sport influences social health through interconnected biological, psychological, and social pathways. Participation in sport supports physical health while simultaneously strengthening psychological resources such as self-efficacy, self-esteem, and resilience. These benefits are complemented by the development of social connections and belongingness, which may contribute to reductions in loneliness. In turn, reduced loneliness may facilitate greater social engagement and continued participation in sport, thereby reinforcing the processes that generated these benefits in the first place. As a result, the relationship between sport participation and social health may be understood as a dynamic and reciprocal process rather than a simple linear pathway.

This perspective provides the foundation for the **Sport Is Social Medicine (SSM)** approach proposed in the present review (Figure 2). Whereas the **Exercise Is Medicine (EIM)** movement has successfully highlighted the preventive and therapeutic value of physical activity for physical and mental health (Sallis, 2009; Lobelo et al., 2014; Thompson et al., 2020; Sjøgaard et al., 2016; Berg et al., 2026; Bricca et al., 2026), the SSM perspective extends this rationale to the social domain of health. Specifically, SSM conceptualizes sport not only as a means of improving physical fitness but also as a public health intervention capable of

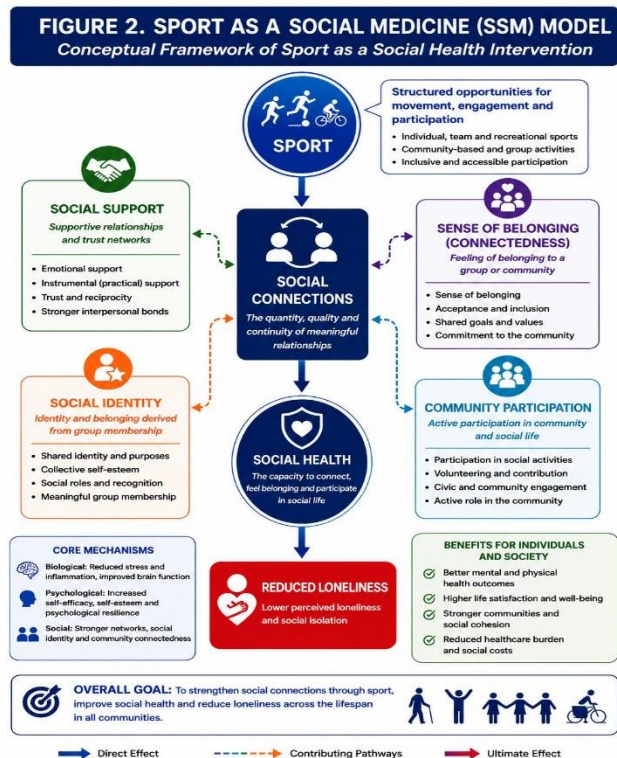
strengthening social connection, fostering belongingness, increasing social participation, and promoting social health.

Figure 2. Sport as a Social Medicine (SSM) Model: Conceptual Framework of Sport as a Social Health Intervention.

From this perspective, sport settings should be viewed not merely as places where physical activity occurs, but also as relational environments in which social identities are formed, social support is generated, and meaningful connections are established (Haslam et al., 2016). Accordingly, sport may serve as a strategic intervention for addressing loneliness while simultaneously strengthening the broader social conditions that support health and well-being. In this way, the SSM perspective complements existing Exercise Is Medicine initiatives by emphasizing the social value of sport as a resource for promoting social connection and social health across the lifespan.

Social Health as the Central Outcome of the SSM Perspective

Within the Sport is Social Medicine (SSM) perspective proposed in this review, social health is conceptualized as the primary public health outcome of sport participation. Although reductions in loneliness represent an important and desirable outcome, contemporary social connection frameworks increasingly emphasize that the broader objective should be the promotion of social health through strengthened social relationships, belongingness, social participation, and community engagement. Accordingly, social health occupies a central position within the SSM framework, extending beyond the mere absence of loneliness or social isolation. However, accumulating evidence suggests that individuals' health status cannot be fully understood solely through biological and psychological processes. The relationships people establish with others, their participation in social life, and their connections with the broader social environment are increasingly recognized as important determinants of well-being. Consequently, the concept of social health has gained growing attention within health sciences and public health research (Dooris et al., 2022; Luchetti et al., 2024).



In general, social health refers to an individual's capacity to establish and maintain meaningful relationships, participate in social networks, fulfill social roles, and experience a sense of belonging within communities. The concept encompasses not only the existence of social ties but also their quality, continuity, reciprocity, and the extent to which they foster social connectedness and belonging. Therefore, social health represents a fundamental indicator of how effectively individuals are integrated into social life and connected to their surrounding communities (Dooris et al., 2022).

In light of these developments, increasing attention has been directed toward the view that social health should be considered a fundamental dimension of health alongside physical and mental health. Several scholars have described social health as the “*neglected dimension*” or the “*fourth dimension*” of health in contemporary societies (Keyes, 1998; Dooris et al., 2022; Warren, 2026). Consistent with this perspective, and supported by the recent framework of the World Health Organization Commission on Social Connection (WHO, 2025), social health is increasingly conceptualized as a positive health outcome and capacity that extends beyond the mere absence of loneliness or social isolation. Consistent with this perspective, social health is increasingly viewed as a positive and measurable dimension of health rather than simply the absence of loneliness, social isolation, or social dysfunction. From the standpoint of the SSM framework, the ultimate value of sport lies not only in its potential to reduce loneliness but also in its capacity to strengthen the broader social resources that support health and well-being.

Within the SSM perspective, sport and physical activity are viewed not only as health-promoting behaviors but also as social environments in which social relationships, belongingness, social participation, and community engagement can develop. Through these processes, sport may contribute to the enhancement of social health across the lifespan. Consequently, social health is positioned as the central outcome of the SSM framework, whereas reductions in loneliness represent one important pathway through which these broader social health benefits may emerge (Figure 2).

Strengthening Social Connections Through Sport

If social health represents the primary outcome of the SSM perspective, social connection may be viewed as the principal process through which these outcomes emerge. Consistent with the theoretical perspectives discussed under the social mechanisms of sport, sport represents an important social environment that facilitates interpersonal relationships and contributes to the reduction of loneliness. Its value extends beyond merely bringing individuals together in a shared physical space; sport provides opportunities for regular interaction, shared

goals, cooperation, and collective experiences. Team sports, sport clubs, and community-based programs enable individuals to work toward common objectives, share achievements, and develop meaningful social relationships. Through these processes, participants may expand their social networks, strengthen their sense of belonging, and experience greater social connectedness (Hwang et al., 2019; Hansen et al., 2024; Martins et al., 2025). Whether participation occurs individually or within groups, sport can help individuals perceive themselves as members of a broader community. Indeed, participation in sport and physical activity programs has been associated with increased perceived social support, more frequent opportunities for social interaction, stronger social connectedness, and lower levels of loneliness (Eime et al., 2013; Jenkin et al., 2017; Khan & Bolina, 2020; Martins et al., 2025).

The social benefits of sport extend beyond interpersonal relationships and may also contribute to broader forms of community engagement and social capital development. Social capital refers to the networks of trust, reciprocity, and cooperation that facilitate collective action and social cohesion. Sport clubs, local events, volunteer activities, and community-based programs create opportunities for individuals to build social ties and strengthen community integration (Eime et al., 2013). From the perspective of the proposed Biopsychosocial Loop Model, trust-based relationships and shared social identities developed within sport settings may contribute to reduced loneliness (Figure 1). In turn, lower levels of loneliness may encourage continued participation in social activities and sport involvement, thereby reinforcing the reciprocal processes described in the model. Furthermore, the social support, belongingness, group membership, and community participation fostered through sport closely align with the core dimensions of social health (Figure 2). Accordingly, the available evidence suggests that the benefits of sport extend beyond physical and psychological outcomes and may also contribute to the promotion of social health. This growing body of evidence provides an important foundation for contemporary social prescribing initiatives and community-based public health strategies. The following section therefore considers the practical role of sport within social prescribing and public health practice.

Sport in Social Prescribing and Public Health Practice

Growing evidence regarding the adverse health consequences of loneliness, social isolation, and poor social connectedness has prompted healthcare systems to explore new intervention models targeting these challenges. While traditional healthcare services have primarily focused on the diagnosis and treatment of biological and psychological conditions, contemporary approaches increasingly recognize the importance of addressing the social

determinants of health. Within this context, social prescribing has emerged as a promising strategy for connecting individuals with community resources and participation opportunities that support health and well-being (Drinkwater et al., 2019; Husk et al., 2019). Rather than relying solely on medical treatments, social prescribing involves referring individuals to social, cultural, educational, or physical activity-based programs. Its primary aim is to strengthen social connections, increase community participation, and enhance social health. Such interventions are increasingly being implemented among individuals experiencing loneliness, social isolation, mild-to-moderate mental health difficulties, chronic health conditions, and reduced quality of life (Bickerdike et al., 2017; Husk et al., 2019; WHO, 2025).

Within the spectrum of social prescribing interventions, sport- and physical activity-based programs represent one of the most widely utilized and potentially inclusive approaches. Walking groups, community-based exercise initiatives, recreational activities, and partnerships with local sport clubs have become prominent examples of social prescribing practices in many countries (Husk et al., 2019; WHO, 2025). The growing recognition of sport as a strategic intervention within these initiatives is largely attributable to its accessibility and its capacity to influence well-being across multiple domains. In particular, group-based physical activity programs extend beyond individual exercise by providing opportunities for peer support and structured social interaction. In this regard, such initiatives may be viewed as practical expressions of the Sport is Social Medicine (SSM) perspective proposed in the present review. Participation in collective sport and physical activity programs may encourage active engagement in community life while simultaneously fostering social connectedness and strengthening community ties (Haslam et al., 2016; Hansen et al., 2024).

Nevertheless, the evidence regarding the effectiveness of social prescribing remains mixed (Veronese et al. (2021)). Although several systematic reviews and evaluation reports have documented positive effects on social relationships, quality of life, and psychological well-being, findings have varied considerably due to differences in intervention design, duration, target populations, and evaluation methods (Bickerdike et al., 2017; Drinkwater et al., 2019; Husk et al., 2019). Consequently, the effectiveness of sport-based social prescribing interventions requires further examination through longitudinal, experimental, and implementation-focused research.

At the same time, contemporary public health frameworks increasingly recognize loneliness as an important social determinant of health rather than merely an individual concern. The World Health Organization Commission on Social Connection has emphasized that

addressing loneliness and social isolation requires community-based approaches in addition to individual-level interventions (WHO, 2025). From this perspective, sport may be viewed not only as a means of promoting healthy lifestyles but also as a public health resource capable of enhancing social participation, strengthening social integration, and supporting social health.

The public health potential of sport may be particularly relevant for older adults, individuals living with chronic conditions, socially disadvantaged populations, and those at elevated risk of loneliness. Community-based sport programs can facilitate social re-engagement, promote the development of new relationships, and encourage more active participation in community life, while simultaneously supporting social inclusion, social capital, and community cohesion (Eime et al., 2013; Dooris et al., 2022). Accordingly, sport represents a valuable component of both social prescribing initiatives and social connection-oriented public health strategies. Current evidence suggests that sport-based interventions may offer accessible, scalable, and potentially sustainable approaches for supporting individuals at risk of loneliness and promoting social health across diverse populations.

Strengths and Limitations

This review has several limitations. First, the study was conducted as a conceptual narrative review and did not follow a formal systematic review protocol. Accordingly, the findings should not be interpreted as a comprehensive assessment of all available evidence, but rather as a conceptual perspective derived from the existing literature.

Second, the proposed Biopsychosocial Loop Model and Sport is Social Medicine (SSM) perspective are conceptual frameworks developed from existing empirical and theoretical evidence. Although many of the individual relationships described within the model are supported by previous research, the model itself has not yet been directly evaluated as an integrated framework. Future longitudinal, experimental, and intervention-based studies are needed to examine the proposed pathways and feedback processes and to evaluate the effectiveness of sport-based approaches for reducing loneliness and promoting social health.

Conclusion

Loneliness is increasingly recognized as a major public health challenge that affects individual well-being, population health, and healthcare systems worldwide. Contemporary evidence suggests that loneliness is a multidimensional phenomenon shaped by interconnected biological, psychological, and social processes. As understanding of the health consequences of social relationships continues to expand, loneliness has increasingly been examined within broader frameworks of social connectedness and social health.

The literature reviewed in this study indicates that sport has the potential to influence multiple pathways associated with loneliness simultaneously. Through its effects on inflammation and stress regulation, self-efficacy and psychological resilience, and social connectedness and belongingness, sport appears to operate through a set of interrelated biopsychosocial mechanisms. Building upon this evidence, the proposed **Biopsychosocial Loop Model** (Figure 1) offers a conceptual framework for understanding how sport participation may contribute to reduced loneliness through the interaction of biological, psychological, and social pathways. The model further suggests that reductions in loneliness may reinforce continued sport participation, psychosocial well-being, and social engagement, thereby creating a potentially sustainable feedback process.

At the same time, contemporary approaches increasingly emphasize that the goal of loneliness interventions should extend beyond merely reducing loneliness itself and should instead focus on strengthening social connectedness, belongingness, and participation in community life (WHO, 2025). Guided by this perspective, the **Sport is Social Medicine (SSM)** framework proposed in this review (Figure 2) provides a complementary conceptual lens through which the role of sport in social health and public health can be understood. Rather than viewing sport solely as a means of improving physical health, the SSM perspective conceptualizes sport as a multidimensional social health resource capable of strengthening social connections, fostering belongingness, and promoting community participation. In this way, the biopsychosocial processes described in Figure 1 may be situated within the broader social health and public health perspective illustrated in Figure 2.

Despite growing evidence, much of the existing literature remains based on cross-sectional research designs. Future studies should employ longitudinal, experimental, and intervention-based methodologies to clarify the causal relationships between sport participation and loneliness. Comparative investigations examining team and individual sports, recreational and competitive participation, and different age and risk groups may further enhance understanding of the conditions under which sport is most effective. Additionally, future research would benefit from simultaneously examining social connectedness, belongingness, social identity, and social health in order to provide a more comprehensive understanding of the mechanisms linking sport participation to loneliness outcomes.

Overall, the available evidence suggests that the relationship between sport and loneliness cannot be explained solely through physical or psychological benefits. Sport may contribute to biopsychosocial well-being at the individual level while simultaneously fostering

social connectedness, belongingness, and participation in community life. Furthermore, sport environments may promote trust, reciprocity, and social cohesion among individuals and communities, thereby supporting the development of social capital. Future research may also benefit from simultaneously examining social connectedness, belongingness, social identity, and social health in order to provide a more comprehensive understanding of the mechanisms linking sport participation to loneliness outcomes. The integration of sport into community-based initiatives, social prescribing strategies, and public health policies may provide accessible and scalable opportunities to strengthen social connections, promote social inclusion, and support health equity. Consequently, the role of sport in addressing loneliness and promoting social health deserves greater attention within both public health research and practice. Together, the Biopsychosocial Loop Model and the Sport is Social Medicine perspective may serve as a conceptual basis for positioning sport as a public health resource with the potential to strengthen social connection and promote social health across the lifespan.

Competing Interest

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Availability of data and materials

No datasets were generated or analysed during the current study.

Authors' contributions

CA conceived the study, conducted the literature review, developed the conceptual framework, and wrote and approved the final manuscript.

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