Chapter

Social Isolation in Youth: A Public Health Challenge and the Emerging Role of Telepsychotherapy

Maria Gloria Rossetti, Francesca Girelli, Niccolò Zovetti, Isabella Fanizza, Antonella delle Fave, Fabrizia Claudia Guarnieri, Paolo Brambilla, Antonio Trabacca and Marcella Bellani

Abstract

This chapter explores the phenomenon of social isolation, focusing on its defining characteristics, prevalence across populations, and its association with various psychopathological conditions, including depression, anxiety, and psychotic symptoms. Drawing on recent empirical findings, we highlight how social isolation has emerged as a significant public health concern, particularly in vulnerable and underserved groups. We then introduce a telematic psychotherapeutic intervention developed by our research group, designed specifically for adults experiencing chronic social isolation, who face barriers in accessing traditional, face-to-face mental health care through national health systems. The intervention leverages digital platforms to provide structured psychological support remotely. Finally, we present preliminary findings from an ongoing randomized controlled trial conducted at our laboratory and affiliated research center in Italy, aimed at assessing the clinical efficacy and feasibility of such intervention. These findings offer early insights into the potential of digital treatments to bridge existing gaps in mental health service provision.

Keywords: social isolation, loneliness, digital intervention, CBT, psychotherapy, telemedicine, hikikomori

1. Introduction

Social isolation (SI) is a multidimensional phenomenon related to loneliness and social withdrawal. It can be described objectively as the absence of social contacts and interactions and, subjectively, as the feeling of being disconnected from others. SI affects different populations, with adolescents and the elderly being particularly vulnerable. The prevalence of SI varies according to demographic characteristics, cultural norms, and contextual factors such as urbanization. The rapid digitalization

of recent years has further shaped its dynamics. While some studies link internet use to greater loneliness and SI, others suggest potential protective effects, especially in older populations.

SI is increasingly recognized as a major public health concern due to its impact on both physical and psychological health. It has been associated with cardiovascular disease, immune dysregulation, depression, anxiety, cognitive decline, premature mortality, and higher costs for the healthcare systems.

In the following sections, operational definitions, epidemiology, and health consequences of SI will be further detailed, as well as the role of traditional versus digital psychotherapeutic interventions. The final chapter will present preliminary findings from a research project applying digital interventions for young adults with SI.

1.1 Definition of social isolation

SI, loneliness, and social withdrawal are distinct yet interconnected aspects with severe consequences on physical health, psychological well-being, and functioning. SI encompasses both objective and subjective aspects. Objective SI refers to a measurable lack of social interactions or contacts, typically evaluated by the number of social interactions and the frequency of engagement in social contexts. Conversely, subjective SI focuses on the emotional experience of lacking meaningful social connections and feeling disconnected from one's social network, even when others are physically present [1, 2]. Subjective SI overlaps with loneliness, which is defined by the perceived inadequacy of one's social relationships, regardless of their actual number or frequency [3]. Loneliness reflects an inner sense of dissatisfaction related to unmet social needs and the perceived insufficiency of existing interpersonal relationships [4, 5]. Social withdrawal refers to the intentional avoidance of social interactions [6], which can lead to severe conditions such as the hikikomori syndrome, "a form of pathological social withdrawal or SI whose essential feature is physical isolation in one's home" [7]. Core symptoms of Hikikomori syndrome include a withdrawal period extending for at least 6 months, significant confinement at home, and considerable functional impairment or distress resulting from prolonged isolation [7].

Gaining a deeper understanding of these constructs requires examining their operational definitions, overlaps, and differences. For instance, as shown by Amendola et al., terms like SI and social withdrawal are often employed interchangeably, despite referring to distinct phenomena with different processes and effects [8]. Specifically, the poor operationalization of these constructs may lead to errors in differentiating between individuals who are physically isolated and those who deliberately avoid social interactions. This conceptual ambiguity hampers the comparability of studies and the development of targeted interventions. To address these problems, Amendola et al. [8] propose a theoretical conceptualization that specifies the distinctions and overlaps between SI and social withdrawal. The former may be characterized by an objective lack of social contact or interactions and often affects individuals such as retirees, houseworkers, or those who are disabled or functionally impaired. The latter, social withdrawal, refers to a subjective pattern of behavior marked by the intentional avoidance of social interaction. According to the authors, within this framework, the hikikomori syndrome may be conceptualized as a psychiatric condition coexisting within the two dimensions, as both objective SI and intentional withdrawal are present. Notably, the model also differentiates between non-pathological and pathological forms of withdrawal; the former may include peer-isolated

youth, and the latter complex conditions such as autism spectrum disorder, mood and anxiety disorders, and personality disorders [8].

Clarifying the operational definitions of SI and their overlaps is essential, as different conceptualizations of SI directly inform its measurement and the estimation of its prevalence across populations and contexts.

1.2 Epidemiology of social isolation

The prevalence of SI varies significantly across demographic groups (e.g., older adults, youths, and clinical populations), geographic regions (e.g., Eastern and Western countries), and the degree of urbanization of one's living environment (e.g., metropolitan areas versus rural communities). Recent epidemiological data suggest that up to 12% of the general population in Western countries experiences some form of SI [8, 9]. Older adults are generally identified as the most vulnerable group, as recent studies have shown that up to 20% of older adults report moderate to severe levels of social disconnection and loneliness [10]. Similarly, adolescents and young adults are increasingly reporting elevated levels of loneliness, although this may not necessarily be associated with increased objective SI [11]. Moreover, SI is frequently observed in psychiatric disorders such as schizophrenia, major depressive disorder, anxiety disorders, and autism spectrum [12, 13] for which it can be both considered a risk factor and a consequence.

SI is a complex and multifaceted phenomenon influenced by individual, interpersonal, and psychological determinants, as well as by cultural norms and roles—an aspect that has received growing recognition in recent studies. For example, Meehan et al. [14] advocate for a systems-based, social-ecological approach to understanding SI, identifying factors such as neighborhood safety, availability of public spaces, cultural practices, and ageism (i.e., systemic stereotyping, prejudice, and discrimination against individuals or groups based on their age, and particularly older adults) as crucial determinants. According to the authors, community and societal interventions may mitigate SI [14]. Other authors, such as Rokach et al. [15], also examine the effects of culture on SI, suggesting that individuals living in collectivist societies (e.g., Eastern countries), despite having stronger family and communal ties, may experience heightened loneliness due to elevated expectations for social connectedness and stigmatization of emotional expression [15]. For example, strong familial and community ties may offer early protection against SI. However, these same structures may also lead to increased stigma, especially when mental health issues could be interpreted as a potential source of family dishonor or individual weakness [16, 17]. Conversely, other authors such as Barreto et al. analyzed data from over 46,000 participants with the aim of examining associations between culture and loneliness, finding that loneliness was more prevalent in individualistic cultures (e.g., Western countries), particularly among young men, and inversely related to age [18]. Other factors may also contribute to SI. For example, two studies by Horan and Ochnik examined the relationship between SI, loneliness, social media, and the degree of urbanization of one's living environment [19, 20], investigating how social media shapes one's perception of SI and loneliness and how different levels of urbanization and neighborhood cohesion may affect mental health. The authors found a direct correlation between the number of hours spent browsing social media and the severity of SI as measured via self-reported questionnaires [19, 20]. Interestingly, those who spent more than 2 hours every day on social

media attributed their condition to social media itself. Moreover, Horan suggested a relationship between social media and urbanization, as those living in suburban regions were less likely to associate SI and loneliness with social media use when compared with their counterparts living in urban or rural areas. The authors speculated that suburban environments may offer a balance between online interactions and real-life social engagements [19]. Similarly, Ochnik et al. [20] analyzed the interrelationship between urbanization, mental health, physical wellbeing, social cohesion, and loneliness in more than 3000 adults and found that people living in medium-sized cities (from 100 k to 300 k inhabitants) were less likely to be lonely or socially isolated when compared with people living in urban or rural regions. Moreover, in this study, the degree of urbanization was not found to directly impact loneliness and SI, acting instead as a mediator variable between sociodemographic and psychological factors [20].

Lastly, it remains unclear whether digitalization (e.g., internet and social media use) has a beneficial or detrimental effect on SI and loneliness. Existing evidence is limited and frequently mixed, likely due to the influence of contextual factors such as age, demographic characteristics, and the quality and frequency of online interactions. For example, a bidirectional model has been proposed, in which online interactions can either reduce or increase loneliness and SI depending on the user's intention (i.e., maintain existing relationships, reconnect versus substitute face-to-face interactions). Specifically, the authors discuss two complementary frameworks: the "displacement hypothesis," where online use replaces and diminishes real-world social contact, and the "stimulation hypothesis," where digital platforms foster new connections [21]. A more recent work examines the quality of social media use and its association with SI and loneliness. The authors found an association between the use of platforms that facilitate passive consumption of content and greater loneliness. Conversely, participants who used networking-oriented platforms, through which they were likely to interact with people they also knew offline, did not report above-average feelings of loneliness [22]. Other recent meta-analyses have shown that (i) greater internet use is consistently associated with higher levels of loneliness across different study designs, age groups, and cultural contexts and (ii) loneliness and SI are associated with increased rates of dysfunctional, compulsive, or impulsive internet use. These findings suggest a bidirectional relationship: loneliness may contribute to problematic internet use, which in turn can intensify feelings of loneliness, creating a self-perpetuating cycle [23, 24]. In contrast with this, there is also evidence showing that internet and social media use can lead to protective effects against SI in older individuals. Specifically, social and recreational internet use was found to be associated with lower levels of SI and loneliness in elderly people [25]. To summarize, the evidence today is mixed, showing both positive and negative associations between digitalization and SI. The conflicting results appear to be explained by a combination of factors, including demographic characteristics, users' personal motivations for using the internet (e.g., maintaining versus replacing real-life relationships), and the quality and frequency of their online interactions.

As a whole, these studies emphasize the concept that SI cannot be explained by a single determinant as it is a multifaceted phenomenon, influenced by several factors: demographic and clinical characteristics, cultural and societal norms, contextual and environmental variables (urbanization, neighborhood safety, availability of public spaces), as well as digitalization and online behaviors (quality, frequency, and purpose of internet and social media use).

1.3 Social isolation and health

SI is increasingly recognized as a major public health problem, given its profound impact on physical health, psychological well-being, cognitive function, and overall daily functioning [2]. Particularly, SI has been associated with increased risk of mortality, cardiovascular disease, elevated blood pressure, and immune system dysfunction [26, 27]. Furthermore, socially isolated individuals often exhibit greater stress reactivity (e.g., higher cortisol levels), poorer sleep quality, and a higher prevalence of chronic health conditions [27]. Moreover, some studies suggest that a lack of social connections can have similar health consequences to smoking 15 cigarettes a day, and that loneliness and SI may have worse outcomes than risk factors such as obesity and physical inactivity [27]. From a psychological perspective, SI has been associated with several psychiatric disorders such as major depression, anxiety, and psychotic disorders [28, 29]. The relationship appears to be bidirectional: SI can increase vulnerability to these disorders, while the disorders themselves can, in turn, worsen SI. For example, individuals with depression may withdraw due to low energy, self-stigma, or feelings of burdensomeness, which further intensifies their depressive symptoms [30].

As a result of the negative health implications, SI and loneliness may bring significant economic burden for public healthcare systems. Specifically, recent analyses estimate that SI significantly increases healthcare services utilization and costs. For example, recent reviews of the literature reported excess costs linked to loneliness and SI, ranging from US$2 billion to US$25.2 billion per year, providing additional evidence on the economic burden of loneliness and SI [31, 32]. These costs may be explained by the associations between SI and cardiovascular disease, depression, and premature mortality, leading to increased demands on healthcare systems. At the societal level, these effects translate into billions of dollars in additional costs each year, underscoring SI as not only a public health concern but also an economic challenge.

2. Treating social isolation: From traditional to digital psychotherapy

Increased recognition of SI/loneliness as risk factors for adverse psychological and physical health outcomes has elevated interest in interventions to reduce psychological issues associated with these conditions. To date, different approaches of in-person treatments have been put in place, including one-on-one interventions, group therapy, and wider community interventions. Similarly, different treatment objectives were taken into consideration, including enhancing social support, increasing opportunities for social interaction, improving social skills, and addressing maladaptive social cognition. Meta-analyses show that, among these social and psychological interventions, the most successful are the psychological interventions addressing maladaptive social cognition [33, 34]; although results should be interpreted with caution due to the small magnitude of the effects and significant heterogeneity among the included studies [35, 36].

Despite the promising results, it is well known that individuals suffering from SI often do not access traditional public health services, due to the social barrier intrinsic to the condition (e.g., fear of social exposure and stigma) [37].

Recent technological advancements have led to the development and widespread use of online support platforms, video calls, and social networking. Compared to traditional face-to-face approaches, digital interventions present several potential benefits as they can engage individuals who might otherwise avoid treatment because

of stigma, shame, health limitations, or distance. They also allow greater flexibility, as they can be accessed at any time and from any place. In addition, telematic and remote interventions are often cost-efficient and easily scalable. Lastly, these interventions can be tailored to personal circumstances, preferences, and specific difficulties related to SI, which is crucial for improving their effectiveness [38].

Moreover, digital interventions (psychotherapies) seem to be as effective as traditional interventions in reducing the severity of symptoms of different mental health conditions [37]. Specifically for SI, a recent meta-analysis showed that, in line with traditional approaches, digital psychological interventions—especially those with social components—were effective in reducing loneliness [38].

Overall, the evidence suggests that digital interventions represent a valid alternative to face-to-face treatments.

3. Digital interventions in practice: Early insights from the SOLITAIRE project

In this section, we present the methods and preliminary findings from the SOLITAIRE project, an Italian multicenter randomized clinical trial started in May 2023 that will end in May 2026.

3.1 Methods

The project aims to assess the feasibility and preliminary efficacy of multimodal digital interventions for adolescents (ages 11–17) and young adults (ages 18–45) with SI, as well as their family members.

Different treatment approaches are employed, including cognitive behavioral therapy (CBT) and cognitive remediation (CR) for socially isolated participants, and psychoeducation for family members. All interventions, as well as the pre-post treatment evaluations, are delivered online. Participants with SI are randomly assigned to the control group (CBT) or the experimental group (CBT + CR). The assessment and treatment of the adult and adolescent subpopulations are conducted, respectively, by the Psychiatry Unit of the Azienda Ospedaliera Universitaria Integrata of Verona, Italy, and by the Unit for Severe Disabilities in Developmental and Young Adult Age at IRCCS Eugenio Medea, Brindisi, Italy. Additional details on the project design, objectives, and methodological approach can be found at https://clinicaltrials.gov/ (ID: NCT06138301).

For the purpose of this chapter, we present data on adults with SI treated with CBT.

3.1.1 Study population

Recruitment began in November 2023 and is currently ongoing. At our research center, young adults with SI are recruited through the psychiatry department of the local university hospital or promotional materials disseminated on social networks and in public locations of the community (e.g., universities and libraries).

Inclusion criteria

1. Age 18–45 years

2. Moderate-to-high levels of SI as detected by clinical evaluation and confirmed by the Hikikomori Questionnaire – 25 items (HQ-25) [39]

3. Stable pharmacotherapy and symptomatology in the last 3 months

4. No structured suicidal ideation

5. Not being in psychotherapy or being willing to interrupt it during the study

6. Owing a PC/tabled and an internet connection

3.1.2 Treatment protocol

Inspired by key psychological theories of SI [3, 33], we developed a brief online CBT protocol to address the social and emotional difficulties associated with isolation [40]. Specifically, our CBT protocol targets the transdiagnostic cognitive mechanisms that often underlie perceived and objective SI, including maladaptive social cognitions, avoidance, rumination, and low social engagement. The intervention consists of eight weekly sessions, each lasting approximately 45 minutes. Between sessions, participants are invited to practice the strategies learned through homework. The overall therapy lasts approximately 2 months.

Below, we outline the content, aim, and homework of each session.

- Session 1 – Assessment and therapeutic alliance building.

  In the first session, the therapist asks the patient to recount their life story, identifying past and present factors that have contributed to and are maintaining their current problems, paying particular attention to the interpersonal context. The reasons that led the patient to seek psychological help and their expectations regarding psychotherapy are also explored. Together, the therapist and patient identify dysfunctional beliefs and emotional, cognitive, and behavioral symptoms (e.g., anxiety, rumination, and avoidance) associated with SI. Finally, the therapist works to build a strong therapeutic alliance.

  a. Therapeutic tools employed: Socratic dialog, laddering, ABC.

  b. Homework: Weekly diary of activities (level of activity/perception of utility, pleasure, and self-efficacy in performing activities).

- Session 2 – Sharing the disorder model.

  In the second session, the therapist builds on what has emerged in the first session to introduce a model explaining how the patient's current difficulties may have developed and why they continue to persist. This process helps the patient feel seen and understood in his own functioning, fostering a sense of being mentally represented by the therapist. As a result, it enhances access to internal emotional states, strengthens the therapeutic alliance, and boosts motivation to engage in treatment.

  Presenting the patient's functioning within a coherent model also facilitates the definition of shared therapeutic goals, with the patient actively involved in the process. In addition, the therapist begins to identify personal and contextual resources that may support change throughout the therapy.

a. Therapeutic tools employed: ABC, psychoeducation on problematic emotions (e.g., anxiety and shame) and possible disorders.

b. Homework: weekly diary of activities (level of activity/perception of utility, pleasure, and self-efficacy in performing activities).

- Session 3 – Increasing frustration tolerance and acceptance of feared events.

The aim of this phase of therapy is twofold: first, to help patients increase their tolerance to frustration and, second, to encourage them to accept the risk of feared situations. Tolerating painful experiences rather than avoiding them—for example, by de-catastrophizing the feared scenario and its consequences—helps patients reduce avoidance and protective behaviors and increases the likelihood of participating in social situations.

a. Therapeutic tools employed: cognitive restructuring (e.g., de-catastrophizing scale), diaphragmatic breathing, and safe place.

b. Homework: repetition of identified alternative thought, weekly diary of activities (level of activity/perception of utility, pleasure, self-efficacy in performing activities).

- Session 4 – Reducing self-judgment and rumination

The core of this session is to help patients to adopt an accepting, non-judgmental attitude toward the full range of subjective experience (thoughts, emotions, sensations, urges, desires, etc.). Acceptance and cognitive restructuring reduce self-deprecating thoughts.

a. Therapeutic tools employed: cognitive restructuring (double standard technique, positive reorientation, and cost-benefit analysis) and compassionate mindfulness.

b. Homework: repetition of identified alternative thought, weekly diary of activities (level of activity/perception of utility, pleasure, and self-efficacy in performing activities).

- Sessions 5–7 – Increasing the participation in social situations

Sessions five-to-seven are specifically targeted at modifying the patient's dysfunctional beliefs on self and sociality, often seen as dangerous and sources of negative emotions. By building a representation of positivity, sharing, closeness, and enjoyment, patients start to feel more confident and hopeful about overcoming their fears. Exposure techniques are used to transfer learning from the therapeutic context to real-life situations, increase participation in social situations and to give the patient a more accurate self-image, less determined by his fears.

a. Therapeutic tools employed: gradual exposure in imagination/in vivo, role-playing/modeling exercises on social situations.

b. Homework: gradual assignment of tasks, monitoring diary (negative emotions and thoughts before, during, and after exposure).

- Session 8 - Vulnerability reduction

The final session focuses on consolidating treatment achievements and preventing relapse. The therapist and patient review the entire therapeutic process, reinforcing what has proven most effective. The therapist helps the patient integrate the changes into a new self-image, identifies stressors that may increase the risk of relapse, and ensures the patient is prepared to identify them and has strategies to reduce or cope with them.

3.1.3 Outcome measures

All participants undergo a full clinical evaluation immediately before and after the digital CBT through standardized questionnaires, assessing psychopathological symptoms and functioning such as, depression [Hamilton Depression Rating Scale (HDRS-17)], social anxiety [Social Interaction Self-Statement Test (SISST)], alexithymia [Alexithymia Scale (TAS-20)], quality of life [Manchester Short Assessment of Quality of Life (MANSA)], general health [Short Form Health Survey (SF-36)], global functioning [Global Assessment of Functioning (GAF)], among others. Differences between the score obtained in the pre- and post-intervention assessment are then used to verify the efficacy of the intervention.

3.1.4 Statistical analyses

All statistical analyses were conducted using Stata 18.0 (https://www.stata.com). The sociodemographic characteristics of the sample were measured using descriptive statistics (mean score, range). Then, we explored whether the level of SI at baseline was predicted by psychological symptoms. For this purpose, we run multiple linear regression including alexithymia (TAS-20), social anxiety (SISST-AS), social competence (SISST-CS), depression (HDRS-17), and global functioning (GAF) scores as predictors and HQ-25 scores as outcome variable, controlling for age and sex.

Finally, to assess the effect of the intervention, paired-sample t-tests were used to compare pre- and post-treatment (T0–T1) scores across all clinical outcomes.

3.2 Preliminary findings

At the time of the present analysis, 29 participants were enrolled in the CBT group. Of these, 17 completed the full intervention and post-treatment assessment. Of the remaining 12 participants, 5 dropped out at various stages prior to completion, while 7 were still undergoing treatment.

Of the 17 participants who completed the study, 10 were females and 7 males, with a mean age of 27.6 years. At the baseline, participants showed severe SI (HQ-25 mean score: 65.05 ± 9.18 (cut-off = 42)), a higher level of social anxiety (SISST_SA mean score: 51.29 ± 12.68) than social competence (SISST_SC mean score: 38.17 ± 8.32), mild depressive symptoms (HDRS-17 mean score: 6.82 ± 4.92), possible-to-present alexithymia (TAS-20 mean score: 56.76 ± 12.02), a moderate level of impulsivity

(BIS-11 mean score: 65.59 ± 10.42), moderate difficulties in global functioning (GAF mean score: 60.41 ± 10.59), and modest dissatisfaction for life's quality (MANSA mean score 2.95 ± 0.80).

3.2.1 Clinical predictors of social isolation at baseline

Associations between the severity of SI and clinical symptomatology at baseline are shown in **Table 1**. Among the clinical variables examined, worse depressive symptoms (HDRS-17) and lower perceived quality of life (MANSA) emerged as the only significant predictors of greater levels of SI (**Figure 1**, **Table 1**). No significant effects were found for alexithymia (TAS-20), social anxiety (SISST_SA), social competence (SISST_SC), impulsivity (BIS-11), or global functioning (GAF) in predicting HQ-25 scores.

3.2.2 Clinical changes after the CBT-based tele-psychoterapy

After the CBT-based intervention, participants showed a significant improvement in three out of four measures of SI derived from the HQ-25, including *Isolation* and *Socialization* subscales and the *total score*. Moreover, there was a reduction in depressive symptoms and an improvement in global functioning (**Table 2** and **Figure 2**). Conversely, no significant changes were observed in the HQ-25 emotional support subscale: alexithymia, social anxiety, social competence, impulsivity, or perceived quality of life.

Clinical scale	**r**	***p***
HDRS-17	0.26	0.027
MANSA	−2.76	0.016
TAS-20	0.44	0.211
SISST_SA	0.24	0.423
SISST_SC	0.07	0.790
BIS-11	0.14	0.653
GAF	−0.38	0.171

Table 1.
Associations between social isolation and outcome measures at baseline.

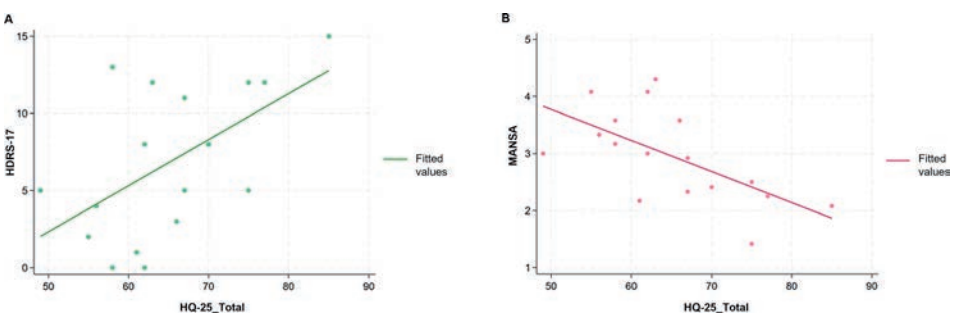

Figure 1.
Regression plots showing the association between HQ-25 total score and A HDRS-17 and B MANSA scores at baseline, adjusted for sex and age.

Clinical variables	T0 (mean ± SD)	T1 (mean ± SD)	*t-test*	*p*
HQ-25				
Isolation	23.53 ± 4.35	17.71 ± 6.45	3.29	*0.005*
Socialization	29.76 ± 6.35	23.94 ± 8.95	3.45	*0.003*
Emotional support	11.76 ± 0.89	10.12 ± 4.21	1.42	0.176
Total	65.05 ± 2.23	51.76 ± 15.97	3.28	*0.005*
Alexithymia *TAS-20*	56.76 ± 2.92	54.94 ± 2.70	1.41	0.271
Depression *HDRS-17*	6.82 ± 4.92	4.94 ± 4.48	2.96	*0.009*
Social competence *SISST SC*	38.17 ± 8.32	37.11 ± 10.28	0.74	0.469
Social anxiety *SISST-SA*	51.29 ± 12.68	48.17 ± 11.07	1.47	0.160
Impulsivity *BIS-11*	65.59 ± 10.43	64.59 ± 11.50	0.83	0.419
Global functioning *GAF*	60.41 ± 10.59	67.17 ± 13.52	−3.64	*0.002*
Quality of life *MANSA*	2.95 ± 0.80	3.24 ± 1.25	−1.08	0.295

Table 2.
Pre-to-post treatment differences.

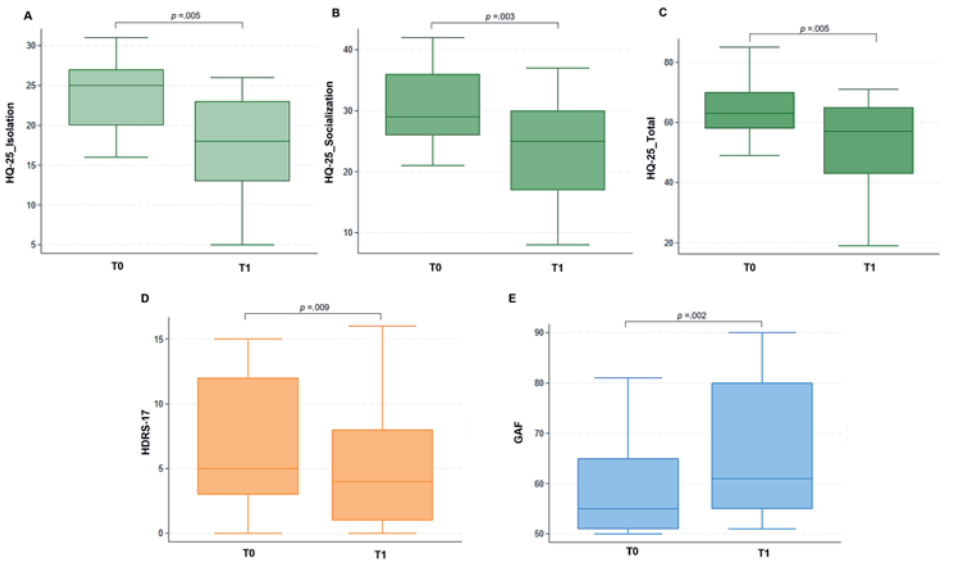

Figure 2.
The box plots show the scores obtained by the study participants on the A HQ-25 isolation subscale, B HQ-25 socialization subscale, C the HQ-25 total scale, D the HDRS-17, and E the GAF before (T0) and after (T1) the treatment with the digital CBT.

3.3 Discussion

Preliminary findings are promising and indicate that the digital CBT-based intervention developed by our group for the SOLITAIRE project [40] is feasible and effective in reducing SI and depressive symptoms and in improving global functioning. These results support the potential of this approach to address previously unmet clinical needs and suggest its possible utility in routine clinical practice.

When considering the predictors of SI, our regression analyses revealed that higher severity of depressive and social anxiety symptoms was associated with more severe isolation at baseline. This result aligns with previous studies demonstrating that internalizing psychopathology is both a risk factor for and a consequence of SI [41, 42]. The bidirectional nature of this relationship underscores the need for integrated treatment approaches that simultaneously target social functioning, social cognition, and emotional symptoms. It also suggests that SI should not be conceptualized as a secondary phenomenon that may precede the onset of psychiatric disorders but rather as a clinically relevant condition in its own right. Based on previous literature and theoretical CBT models, we expected an overall reduction of SI and withdrawal as measured through the HQ-25. Our findings confirm our hypothesis and suggest that the CBT-based protocol developed by our group specifically tackles the transdiagnostic cognitive mechanisms that often underlie perceived and objective SI, including maladaptive social cognitions, avoidance, rumination, and low social engagement. The HQ-25 measures SI across three domains: isolation (the extent of an individual's self-imposed detachment from society and their physical surroundings), socialization (an individual's capacity and engagement in social interactions and relationships), and emotional support (the perceived level of emotional support available to the individual from their social network). Following treatment, scores decreased by approximately 25% on the isolation subscale, 20% on the Socialization subscale, and 20% on the Total HQ-25 score. No significant improvement was observed for the Emotional Support subscale. One possible explanation is that CBT primarily targets dysfunctional cognitions and behaviors related to avoidance and withdrawal, which may more directly impact perceptions of isolation and socialization [43]. By contrast, the availability of emotional support may depend more strongly on external factors—such as the presence of a supportive network—rather than individual cognitive change and therefore may require a different type of interventions (e.g., psychodynamic and systemic) [44, 45].

Among the secondary outcomes, a significant reduction in depressive symptoms was observed. This is in line with a large body of evidence showing the established efficacy of CBT for mood disorders [46], and the tight association between depression and SI [47–49]. By contrast, no significant improvements were found in alexithymia or social anxiety. Nonetheless, the mean scores on alexithymia, social anxiety, impulsivity, and perceived quality of life all showed trends toward improvement. These trends, although not statistically significant, suggest that the intervention may exert broader benefits that could become more evident in larger samples or with longer follow-up assessments. On the other hand, the lack of improvement in difficulties related to emotional awareness and long-standing patterns of social fear and avoidance suggests the potential need for complementary therapeutic modules, such as emotion-focused therapy for alexithymia or exposure-based interventions for social anxiety.

The clinical implications of our findings are noteworthy. First, they show that digital CBT can be delivered to individuals who might otherwise remain unreachable due to stigma, logistical barriers, or the intrinsic avoidance of social contact. This strengthens the argument for incorporating digital platforms into routine care for socially withdrawn populations. Second, the partial but significant improvements observed highlight the importance of tailoring interventions to individual needs, possibly by integrating CBT with complementary modules such as cognitive remediation, social skills training, or family-based psychoeducation. The SOLITAIRE protocol already embraces this multimodal perspective, and future analysis of the full trial dataset will clarify the relative contribution of each component.

A number of limitations should be acknowledged when interpreting the results. The sample size of the CBT group was small, limiting statistical power and the generalizability of our results. In addition, the reliance on self-report measures may have introduced biases related to subjective perception. Another limitation is that our analyses were restricted to short-term outcomes; longer follow-ups are needed to determine the durability of treatment effects. Despite these limitations, the trial design allowed us to investigate an underrepresented population using a rigorous methodology, and the telemedicine-based format enabled access to participants who might otherwise have been excluded from conventional clinical research. Furthermore, the integration of clinical, psychosocial, and (in future steps) neurocognitive measures will provide a rich framework for understanding SI across multiple levels.

Future research should build upon these findings by conducting larger RCTs with larger and better characterized samples of socially isolated individuals, in and out of psychiatric populations, integrating neurobiological measures that will help explore mechanisms of change. It will also be crucial to examine how digital telemedicine-based interventions can be scaled up and incorporated into existing healthcare systems. In this respect, collaborations between clinical researchers, digital health experts, and policymakers will be essential.

4. Conclusions

SI refers to the objective lack of social contacts and interactions and is distinct from loneliness, which reflects the subjective perception of being alone. As highlighted in this chapter, SI affects both young people and adults and is increasingly recognized as a major public health concern, associated with poorer quality of life, mental health disorders, cardiovascular diseases, cognitive decline, and premature mortality. According to recent studies, SI appears to be influenced by a wide array of factors such as demographic (e.g., age and gender), psychological (e.g., anxiety and depression), and social factors (e.g., family dynamics, social support, and stigma), as well as broader cultural and environmental determinants such as urbanization and digitalization.

Addressing SI is essential, as it impacts not only individuals' mental and physical well-being but also places a burden on healthcare systems.

Digital interventions offer promising opportunities to tackle this issue. They are accessible to a wide audience, can be tailored to individual needs, are more cost-effective than traditional face-to-face interventions, and provide a viable alternative to overcome barriers such as stigma, fear of social exposure, and geographic distance.

Preliminary findings from the SOLITAIRE project are encouraging, suggesting that a brief online CBT protocol specifically designed to address psychological problems related to SI is feasible, acceptable, and effective in reducing SI and depressive symptoms while improving global functioning. Based on these insights, future research should aim to conduct large and long-term studies to clarify the effectiveness of digital approaches, their generalizability across populations, their impact on specific subgroups of socially isolated individuals, and how digital tools can be further tailored to personal needs and sociocultural contexts. By combining traditional psychotherapeutic principles with innovative digital platforms, projects like SOLITAIRE represent a promising step toward addressing the pressing challenge of SI in contemporary society.

Acknowledgements

This chapter was supported by the European Union – Next Generation EU – NRRP M6C2 – Investment 2.1 Enhancement and strengthening of biomedical research in the NHS. Project number: PNRR-MAD-2022-12376834, CUP: E33C22001020006.

We would like to thank the SOLITAIRE group for the contribution (Department of Neurosciences, Biomedicine and Movement Sciences, University of Verona, Verona, Italy and Azienda Ospedaliera Universitaria Integrata Verona, Verona, Italy: Marcella Bellani, Maria Gloria Rossetti, Cinzia Perlini, Francesca Girelli, Niccolò Zovetti, and Maria Diletta Buio; Department of Pathophysiology and Transplantation, University of Milan, Milan, Italy: Paolo Brambilla, Cinzia Bressi, Antonella delle Fave, and Virginia Pupi; CNR Institute of Neuroscience, Vedano al Lambro, Italy: Fabrizia Guarnieri and Edoardo Moretto; Department of Computer Science, University of Milan, Milan, Italy: Roberto Sassi, Maria Renata Guarneri, Stavros Ntalampiras, and Samara Soares Leal; Unit for Severe Disabilities in Developmental Age and Young Adults, Associazione La Nostra Famiglia - IRCCS E. Medea, Scientific Hospital for Neurorehabilitation, Brindisi, Italy: Isabella Fanizza, Lara Scialpi, Giorgia Carlucci, and Mariangela Leucci; Scientific Institute IRCCS Eugenio Medea, Scientific Direction, Bosisio Parini, Lecco, Italy: Antonio Trabacca).

Conflict of interest

The authors declare no conflicts of interest.

DOI: http://dx.doi.org/10.5772/intechopen.1013387

Author details

Maria Gloria Rossetti[1,2], Francesca Girelli[1], Niccolò Zovetti[2], Isabella Fanizza[3], Antonella delle Fave[4], Fabrizia Claudia Guarnieri[5], Paolo Brambilla[4,6], Antonio Trabacca[7] and Marcella Bellani[1,2]*

1 Section of Psychiatry, Department of Neurosciences, Biomedicine and Movement Sciences, University of Verona, Verona, Italy

2 UOC Psichiatria, Azienda Ospedaliera Universitaria Integrata Verona, Verona, Italy

3 Unit for Severe Disabilities in Developmental Age and Young Adults, Associazione La Nostra Famiglia - IRCCS E. Medea, Scientific Hospital for Neurorehabilitation, Brindisi, Italy

4 Department of Pathophysiology and Transplantation, University of Milan, Milan, Italy

5 CNR Institute of Neuroscience, Vedano al Lambro, Italy

6 Department of Neurosciences and Mental Health, Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Milan, Italy

7 Scientific Institute IRCCS Eugenio Medea, Scientific Direction, Lecco, Italy

*Address all correspondence to: marcella.bellani@univr.it

IntechOpen

References

[1] Cacioppo JT, Hawkley LC, Norman GJ, Berntson GG. Social isolation. Annals of the New York Academy of Sciences. 2011;**1231**:17-22

[2] Taylor HO, Taylor RJ, Nguyen AW, Chatters L. Social isolation, depression, and psychological distress among older adults. Journal of Aging and Health. 2018;**30**:229-246

[3] Hawkley LC, Cacioppo JT. Loneliness matters: A theoretical and empirical review of consequences and mechanisms. Annals of Behavioral Medicine. 2010;**40**:218-227

[4] Beutel ME, Klein EM, Brähler E, Reiner I, Jünger C, Michal M, et al. Loneliness in the general population: Prevalence, determinants and relations to mental health. BMC Psychiatry. 2017;**17**:97

[5] Lam JA, Murray ER, Yu KE, Ramsey M, Nguyen TT, Mishra J, et al. Neurobiology of loneliness: A systematic review. Neuropsychopharmacology. 2021;**46**:1873-1887

[6] Rubin KH, Coplan RJ, Bowker JC. Social withdrawal in childhood. Annual Review of Psychology. 2009;**60**:141-171

[7] Kato TA, Kanba S, Teo AR. Hikikomori: Multidimensional understanding, assessment, and future international perspectives. Psychiatry and Clinical Neurosciences. 2019;**73**:427-440

[8] Amendola S, Cerutti R, von Wyl A. Estimating the prevalence and characteristics of people in severe social isolation in 29 European countries: A secondary analysis of data from the European social survey round 9 (2018-2020). PLoS One. 2023;**18**:e0291341

[9] Röhr S, Wittmann F, Engel C, Enzenbach C, Witte AV, Villringer A, et al. Social factors and the prevalence of social isolation in a population-based adult cohort. Social Psychiatry and Psychiatric Epidemiology. 2022;**57**:1959-1968

[10] Courtin E, Knapp M. Social isolation, loneliness and health in old age: A scoping review. Health and Social Care in the Community. 2017;**25**:799-812

[11] Orben A, Tomova L, Blakemore S-J. The effects of social deprivation on adolescent development and mental health. The Lancet Child and Adolescent Health. 2020;**4**:634-640

[12] Bhatti AB, ul Haq A. The pathophysiology of perceived social isolation: Effects on health and mortality. Cureus. 2017;**9**(1):e994

[13] Porcelli S, van der Werff S, Aghajani M, Glennon JC, van Heukelum S, Mogavero F, et al. Social brain, social dysfunction and social withdrawal. Neuroscience and Biobehavioral Reviews. 2019;**97**:10-33

[14] Meehan DE, Grunseit A, Condie J, HaGani N, Merom D. Social-ecological factors influencing loneliness and social isolation in older people: A scoping review. BMC Geriatrics. 2023;**23**:726

[15] Rokach A, Patel K. The health consequences of loneliness. Environment and Social Psychology. 2024;**9**:1-17

[16] Norasakkunkit V, Uchida Y, Toivonen T. Caught between culture, society, and globalization: Youth

marginalization in post-industrial Japan. Social and Personality Psychology Compass. 2012;**6**:361-378

[17] Tajan N, Yukiko H, Pionnié-Dax N. Hikikomori: The Japanese cabinet Office's 2016 survey of acute social withdrawal. Asia-Pacific Journal. 2017;**15**:e2

[18] Barreto M, Victor C, Hammond C, Eccles A, Richins MT, Qualter P. Loneliness around the world: Age, gender, and cultural differences in loneliness. Personality and Individual Differences. 2021;**169**:110066

[19] Horan T. The effects of urbanization and social media use on individuals' perceived social isolation. Online Journal of Communication and Media Technologies. 2024;**14**:e202411

[20] Ochnik D, Buława B, Nagel P, Gachowski M, Budziński M. Urbanization, loneliness and mental health model-A cross-sectional network analysis with a representative sample. Scientific Reports. 2024;**14**:24974

[21] Nowland R, Necka EA, Cacioppo JT. Loneliness and social internet use: Pathways to reconnection in a digital world? Perspectives on Psychological Science. 2018;**13**:70-87

[22] Matthews T, Arseneault L, Bryan BT, Fisher HL, Gray R, Henchy J, et al. Social media use, online experiences, and loneliness among young adults: A cohort study. Annals of the New York Academy of Sciences. 2025;**1548**:194-205

[23] Moretta T, Buodo G. Problematic internet use and loneliness: How complex is the relationship? A short literature review. Current Addiction Reports. 2020;**7**:125-136

[24] Mestre-Bach G, Paiva U, Iniguez LSM, Beranuy M, Martín-Vivar M, Mallorquí-Bagué N, et al. The association between internet-use-disorder symptoms and loneliness: A systematic review and meta-analysis with a categorical approach. Psychological Medicine. 2025;**55**:e77

[25] Heo J, Chun S, Lee S, Lee KH, Kim J. Internet use and well-being in older adults. Cyberpsychology, Behavior, and Social Networking. 2015;**18**:268-272

[26] Holt-Lunstad J, Steptoe A. Social isolation: An underappreciated determinant of physical health. Current Opinion in Psychology. 2022;**43**:232-237

[27] Holt-Lunstad J, Smith TB, Baker M, Harris T, Stephenson D. Loneliness and social isolation as risk factors for mortality: A meta-analytic review. Perspectives on Psychological Science. 2015;**10**:227-237

[28] Cacioppo JT, Cacioppo S. The growing problem of loneliness. The Lancet. 2018;**391**:426

[29] Pupi V, Bressi C, Porcelli PM, Rossetti MG, Bellani M, Trabacca A, et al. Hikikomori (prolonged social withdrawal) and co-occurring psychiatric disorders and symptoms in adolescents and young adults: A scoping review. Comprehensive Psychiatry. 2025;**138**:152573

[30] Rohde N, D'Ambrosio C, Tang KK, Rao P. Estimating the mental health effects of social isolation. Applied Research in Quality of Life. 2016;**11**:853-869

[31] Mihalopoulos C, Le LK-D, Chatterton ML, Bucholc J, Holt-Lunstad J, Lim MH, et al. The economic costs of loneliness: A review of cost-of-illness and economic evaluation studies. Social Psychiatry and Psychiatric Epidemiology. 2020;**55**:823-836

[32] Engel L, Rizal MF, Clifford S, Faller J, Lim MH, Le LK-D, et al. An updated systematic literature review of the economic costs of loneliness and social isolation and the cost effectiveness of interventions: L. Engel et al. PharmacoEconomics. 2025;**43**:1047-1063

[33] Masi CM, Chen H-Y, Hawkley LC, Cacioppo JT. A meta-analysis of interventions to reduce loneliness. Personality and Social Psychology Review. 2011;**15**:219-266

[34] Cacioppo S, Grippo AJ, London S, Goossens L, Cacioppo JT. Loneliness: Clinical import and interventions. Perspectives on Psychological Science. 2015;**10**:238-249

[35] Hansen T, Nes RB, Hynek K, Nilsen TS, Reneflot A, Stene-Larsen K, et al. Tackling social disconnection: An umbrella review of RCT-based interventions targeting social isolation and loneliness. BMC Public Health. 2024;**24**:1917

[36] Ma R, Mann F, Wang J, Lloyd-Evans B, Terhune J, Al-Shihabi A, et al. The effectiveness of interventions for reducing subjective and objective social isolation among people with mental health problems: A systematic review. Social Psychiatry and Psychiatric Epidemiology. 2020;**55**:839-876

[37] Greenwood H, Krzyzaniak N, Peiris R, Clark J, Scott AM, Cardona M, et al. Telehealth versus face-to-face psychotherapy for less common mental health conditions: Systematic review and meta-analysis of randomized controlled trials. JMIR Mental Health. 2022;**9**:e31780

[38] Hansen T, Johansen R, Kirkøen B, Stene-Larsen K, Straiton M, Tornes RA, et al. Digital bridges to social connection: A systematic review and meta-analysis of digital interventions for loneliness and social isolation. Internet Interventions. 2025;**41**:100856

[39] Amendola S, Presaghi F, Teo AR, Cerutti R. Psychometric properties of the Italian version of the 25-item hikikomori questionnaire. International Journal of Environmental Research and Public Health. 2022;**19**:13552

[40] Rossetti MG, Perlini C, Girelli F, Zovetti N, Brambilla P, Bressi C, et al. Developing a brief telematic cognitive behavioral therapy for the treatment of social isolation in young adults. Frontiers in Psychology. 2024;**15**:1433108

[41] Socrates AJ, Mullins N, Gur RC, Gur RE, Stahl E, O'Reilly PF, et al. Polygenic risk of social isolation behavior and its influence on psychopathology and personality. Molecular Psychiatry. 2024;**29**:3599-3606

[42] Pearce E, Birken M, Pais S, Tamworth M, Ng Y, Wang J, et al. Associations between constructs related to social relationships and mental health conditions and symptoms: An umbrella review. BMC Psychiatry. 2023;**23**:652

[43] Hofmann SG, Asnaani A, Vonk IJ, Sawyer AT, Fang A. The efficacy of cognitive behavioral therapy: A review of meta-analyses. Cognitive Therapy and Research. 2012;**36**:427-440

[44] Asen E, Scholz M. Multi-Family Therapy: Concepts and Techniques. London: Routledge; 2010

[45] Laurila M, Lindfors O, Knekt P, Heinonen E. The effect of individual short-and long-term psychotherapy on perceived social support: Analysis of secondary outcomes of a randomized clinical trial. Nordic Journal of Psychiatry. 2024;**78**:230-237

[46] Cuijpers P, Miguel C, Harrer M, Plessen CY, Ciharova M, Ebert D, et al.

Cognitive behavior therapy vs. control conditions, other psychotherapies, pharmacotherapies and combined treatment for depression: A comprehensive meta-analysis including 409 trials with 52,702 patients. World Psychiatry. 2023;**22**:105-115

[47] Van den Brink R, Schutter N, Hanssen D, Elzinga B, Rabeling-Keus I, Stek M, et al. Prognostic significance of social network, social support and loneliness for course of major depressive disorder in adulthood and old age. Epidemiology and Psychiatric Sciences. 2018;**27**:266-277

[48] Bae SM. The association between adverse childhood and adulthood experiences, social isolation, loneliness, and depression among young adults in South Korea. International Journal of Environmental Research and Public Health. 2023;**20**:6900

[49] Matthews T, Danese A, Wertz J, Odgers CL, Ambler A, Moffitt TE, et al. Social isolation, loneliness and depression in young adulthood: A behavioural genetic analysis. Social Psychiatry and Psychiatric Epidemiology. 2016;**51**:339-348