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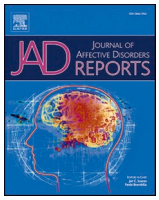

Review Article

The social cost of depression: Investigating the impact of impaired social emotion regulation, social cognition, and interpersonal behavior on social functioning

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ABSTRACT

Depressive disorders are often accompanied by severe and pervasive impairments in social functioning, surpassing those experienced by individuals with other chronic medical conditions. Inability to effectively navigate social situations, establish and maintain healthy relationships lead to significant social stress and isolation. Social cognitive performance has been found to be inversely correlated with depression severity, while negative emotional biases persist even in remission. These social dysfunctions may arise from maladaptive emotion regulation strategies and difficulties interpreting emotional stimuli and mental states. Our article reviews the extensive evidence supporting the notion that depression is primarily a social disorder, examining impairments in self-focused social cognition, other-focused social cognition, and interpersonal behavior. By demonstrating how deficits in these domains result in diminished social functioning, increased stress, and reduced quality of relationships, we underscore the importance of recognizing and addressing the social impact of depression.

1. Introduction

Depression is the leading cause of mental health-related disease burden globally and affects more than 300 million people worldwide (Patel et al., 2016). The number of incident cases of depression worldwide increased by 49.86% from 1990 to 2017, from 172 million to 258 million (Liu et al., 2020). A recent study estimated an additional 53,2 million cases of major depressive disorder globally due to the COVID-19 pandemic (Santomauro et al., 2021). Crucially, depression has a profound effect on interpersonal functioning: many studies have reported a strong association between the severity of a patient's depression and the magnitude of their social impairments (Danneel et al., 2020; Frey and McCabe, 2020; Judd et al., 2000; Molenaar et al., 2007; Ormel et al., 2004; Santini et al., 2020, 2015). According to patients, social impairments are one of the most debilitating consequences of the disorder (Zimmerman et al., 2006).

In the past two decades, researchers have discovered much about the medium- to long-term clinical outcomes of severe depression, but little emphasis has been placed on social functioning in depressed patients. However, this aspect of depression may be the most relevant to patients and to their families because it is essential for successful interpersonal relationships (Knight and Baune, 2019; Kupferberg et al., 2016a; Weightman et al., 2019). Social impairment is strongly related to, but not completely explained by, the psychopathological severity of depression; in some patients, social impairment persists even during remission (Porcelli et al., 2020). Results from a recent review suggest

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that the relationship between psychosocial dysfunction and social cognitive deficits in patients with Major depressive disorder (MDD) (including deficits in affect recognition, eye contact, prosody interpretation, and the ability to infer the mental states of others) cannot be mechanistically explained by mood symptoms or nonsocial cognition (Knight and Baune, 2019). Although social dysfunction improves rapidly in the first six months of depression treatment, it eventually levels off and then fluctuates for up to 10 years (Furukawa et al., 2011). In addition, social impairments have been shown to be remarkably stable in the long term, with over 30% of MDD patients remaining severely impaired and over 10% remaining profoundly impaired up to 20 years after their initial diagnosis (Velthorst et al., 2016). Remitted patients differed significantly from healthy controls with respect to network size, social support, loneliness, and perceived social disability (Saris et al., 2017). Further, they seldom achieved a normal level of social functioning (Hammen and Brennan, 2002; Weissman, 2000) and reported more negative interactions with family, friends, and romantic partners (Zlotnick et al., 2000).

1.1. Depression as a disorder of lost social connections and social stress

Humans are social animals with a profound need to connect with others and gain acceptance into social groups (Deci and Ryan, 2000). To fulfill these needs, humans rely on social emotions, empathy, and theory of mind (Diener and Seligman, 2002; Kupferberg et al., 2018). Being with other people and interacting with them in harmonious relationships are fundamental social behaviors, which lead to social connections. Social relationships do not only increase self-esteem (Harris and Orth, 2020) but also have a strong influence on both mental and physical health as well as longevity (Holt-Lunstad et al., 2010). For example, having poor social relationships is potentially more harmful than being obese, not exercising, or even drinking and smoking excessively (Holt-Lunstad et al., 2010).

However, the effects of MDD on social cognition are more nuanced than the profound performance deficits seen in other neuropsychiatric disorders, such as autism and schizophrenia (Bazin et al., 2009; Derntl and Habel, 2011; Lee et al., 2004; Weniger et al., 2004). Nevertheless, a recent review indicated that the percentage of patients with severe social dysfunction (i.e., an impaired ability to perform and fulfill normal social roles) may be higher for MDD than for bipolar disorder or even schizophrenia (Porcelli et al., 2020). Another recent study demonstrated that MDD patients are comparable to autistic patients with respect to their degree of attentional bias toward, and increased latency to disengage from, negative emotional stimuli (Unruh et al., 2020).

The COVID-19 pandemic has vividly demonstrated that the loss of social contacts can be an important predictor of depression (Benke et al., 2020; Liu et al., 2022). Social disturbances in patients suffering from MDD are pervasive and encompass almost every aspect of their social capabilities (Kupferberg et al., 2016a). In his book *Lost Connections: Uncovering the Real Causes of Depression - and the Unexpected Solutions*, which was a Sunday Times and New York Times Bestseller and received multiple scientific reviews, the Swiss-British writer and journalist Johann Hari described the loss of social connections as the main cause of depression (Bransby, 2018; Morrow, 2020; Sapozhnikov, 2019; Strong, 2018). Especially in the elderly, social isolation, loss of close social contacts or a confidant, and low emotional support from children can serve as potential risk factors for the onset of depressive symptoms (Djernes, 2006).

Although people are naturally bothered when they feel disconnected from others and experience a lack of belonging when relationships deteriorate, depressed individuals may be particularly sensitive to stressful social encounters (Allen and Badcock, 2003). Studies have indeed shown that reactivity to daily interpersonal stressors (e.g., problems with friends, romantic partners, peers, or family) predicted future depressive symptoms, whereas reactivity to non-interpersonal stressors (e.g., occupational, academic, or health difficulties) did not, pointing to the dominant role of social functioning in emotional well-being (O'Neill et al., 2004; Parrish et al., 2011; Sheets and Craighead, 2014). The feelings of loss, humiliation, or rejection that are associated with interpersonal stress can diminish one's sense of self-worth (Macinnes, 2006).

Social cognition deficits in individuals with MDD can start in adolescence (Katz et al., 2011) or even in childhood (Kyte and Goodyer, 2008). For example, observational research has shown that social interactions of children with high levels of depressive symptoms with both familiar and unfamiliar peers are characterized by increased conflict, a more negative affect, and decreased collaboration and mutuality relative to the interactions of children with low levels of depressive symptoms (Rudolph et al., 1994; Schwartz-Mette et al., 2020). When unfamiliar peers interact with clinically depressed adolescents, as opposed to non-depressed individuals, they perceive the depressed individuals to be less interested in establishing a friendship and consider them to be a less desirable potential friend (Connolly et al., 1992; Heller and Tanaka-Matsumi, 1999; Peterson et al., 1985; Platt et al., 2013).

1.2. Social theories of depression

The first interpersonal approaches to depression were developed already in the 1970s, but gained acceptance and empirical support rather slowly. These approaches were initially eclipsed by cognitive and biological proposals, which were attractive because they explained depression in purely biological terms and aimed to treat it with only pharmacological agents. However, mounting evidence suggests that the psychological issue of depression and the social challenge of impaired interpersonal relationships and communication are inherently intertwined. Several scientists have attempted to describe the connection between depressive symptoms and impaired social functioning. These attempts have resulted in a variety of different theories. One theory, called the *emotional information processing theory of depression*, claims that the inability to process emotionally relevant social cues results from increased neural activity in emotion-related brain circuits (e.g. the amygdala and ventral striatum) in response to sad faces and, conversely, diminished neural activity in response to happy faces (Leppänen, 2006).

An alternative theory of depression, known as the *social risk hypothesis*, suggests that depressed states are the result of evolved, adaptive mechanisms that reduce the threat of social exclusion. According to this hypothesis, depressed individuals develop cognitive hypersensitivity and become less likely to engage in risky social ventures. They also show submissive behavior around individuals of higher status, which prevents unwanted confrontations and thereby reduces the chances of rejection or personal harm (Allen and Badcock, 2003; Dunn et al., 2012). Apart from withdrawing from big social groups in favor of a smaller, more trusted group of people, depressed individuals tend to exhibit comfort-seeking behaviors that elicit social support from close and caring peers (Dunn et al., 2012). Belonging to a smaller social group might also help conserve social energy, avoid environmental stressors like social conflicts and criticism (Anders et al., 2013), and prevent depressed individuals and their biological relatives from contracting infections (Anders et al., 2013).

The *interpersonal theory of depression* proposes that depressed individuals often express maladaptive social behaviors with both friends and strangers, such as withdrawing from social situations, seeking excessive reassurance, or expressing negative emotions inappropriately (Coyne, 1976; Joiner, 1999). Depressed individuals may further exhibit anger, irritability, or hostility towards others, increased sensitivity to social rejection, along with the tendency to ruminate on negative interpersonal events. These maladaptive social behaviors can lead to rejection, social isolation, and decreased social support, which can exacerbate symptoms of depression and further impair social functioning. They might also increase the level of social stress and decrease the motivation for cooperative and prosocial behavior.

The *analytical rumination hypothesis of depression* suggests that the

tendency to withdraw and shut down can be viewed as a protective behavior that allocates cognitive resources toward the solution of complex problems (Andrews and Thomson, 2009). Social withdrawal and social anhedonia reduce social distractions, and the depressed person is therefore forced to ruminate on complex problems in an unimpeded and concentrated way.

In contrast to the analytical rumination model, which focuses on the cognitive and attentional benefits of social withdrawal, the *social signal transduction theory of depression* posits that social threats and adversity activate components of the immune system involved in inflammation (Slavich and Irwin, 2014). This leads to a release of proinflammatory cytokines that facilitate cell-to-cell communication during times of threat (Irwin and Cole, 2011). The most well-studied proinflammatory cytokines in the context of psychoneuroimmunology are interleukin (IL)-6, tumor necrosis factor (TNF), IL-1β, and various interferons (IFNs) (Beurel et al., 2020). Blood and cerebrospinal fluid concentrations of IL-6 and TNF have been shown to increase in response to psychological stress in depressed patients (Syed et al., 2018). The primary innate immune system response to contemporary social stressors is important for combating bacteria and other extracellular pathogens (Irwin and Cole, 2011). In addition to facilitating cell-to-cell communication, the proinflammatory cytokines released in response to social stress can cause profound changes in behavior, including sadness, anhedonia, fatigue, psychomotor retardation, and social-behavioral withdrawal. In mice, chronic social stress induces a depression-like phenotype characterized by social avoidance and anhedonia (Ménard et al., 2016). Specifically, social stress undermines the integrity of the blood-brain barrier (Menard et al., 2017), allowing cytokine IL-6 to infiltrate the brain parenchyma and trigger the expression of depression-like behaviors. In humans, inflammation (increase in pro-inflammatory cytokines) can increase sensitivity to negative or threatening social experiences (Moieni and Eisenberger, 2018). For example, in females, the increase in proinflammatory cytokines following endotoxin administration has been associated with a depressed mood and enhances the social pain-related neural response to social exclusion (Eisenberger et al., 2009). A recent review similarly suggested that enhanced attentional processing of negative information, fatigue, negative mood, anhedonia, cognitive impairment, social withdrawal, which belong to characteristic symptoms of depression, are associated with increased level of proinflammatory cytokines and reactivity to cognitive stress (Maydych, 2019).

The biological response to external stress is critical for ensuring survival during times of actual physical threat or injury. However, in modern society, this evolutionary defense program might instead be activated for non-physical threats, such as social, symbolic, anticipated, or even imagined threats. Individuals who experience these threats thus develop an increasingly pro-inflammatory phenotype (Slavich and Irwin, 2014). Discrimination, unemployment, poverty, migration, separation, marital problems, dysfunctional parent-child relationships, and moving residences during adolescence (Hasler et al., 2020) can all cause a high degree of social stress and therefore are some of the most potent triggers and risk factors for MDD.

The critical question of whether impaired social skills are a proximal cause, symptom, or nonsufficient distal cause (i.e., vulnerability factor) of depression remains unanswered. For example, Coyne's insufficient use of social-cognitive appraisal suggests that individuals who excessively seek reassurance and negative feedback, or who focus conversations on themselves, naturally elicit rejection from others (Coyne, 1976). In contrast, Lewinsohn's behavioral theory of depression postulates that individuals with depression often have diminished social skills, making it difficult for them to obtain positive reinforcement from their social environment and thus facilitating their depression (Lewinsohn et al., 1980). Indeed, high perceived social disability in depressed patients has been shown to predict the development of clinical anxiety or depression two years later (Saris et al., 2017).

1.3. The function of self- and other-related factors in social dysfunction

In this review, we discuss three domains of social dysfunction in MDD patients: *self-focused social cognition, other-focused social cognition* and *interpersonal behavior*. Dysfunction in any of these domains can lead to impaired social functioning. For our purposes, *social cognition* refers to the conscious and subconscious psychological processes that underlie social behavior. *Social behavior*, in turn, comprises the readily observable interactions between an individual and other people. *Social functioning* is broader than social behavior and refers to the long-term, contextualized ability of an individual to interact with others (i.e., the individual's behavior within a community over extended time).

Each of the three domains of social dysfunction is composed of several factors. *Self-focused social cognition* encompasses the dysfunctional use of socioemotional regulation strategies, low self-acceptance, self-compassion, social-cognitive flexibility, bias for negative social perception, and deficits in processing social reward with resulting social anhedonia (Fig. 1). *Other-focused social cognition* describes changes in subjective and evaluative indicators of interpersonal and socioemotional functioning. These indicators include impaired emotion recognition, decreased ability to empathize and understand different perspectives, sensitivity to social rejection, tendency for social comparison, negative social attribution bias, and deficits in the ability to forgive. Lastly, *interpersonal behavior* refers to changes in social behavior including elevated anger, increased social avoidance, increased reassurance-seeking, increased altruistic punishment, problematic use of social media and smartphones, and decreased motivation for prosocial behavior.

The relationship between all three domains and their constitutive factors is multidirectional, meaning that they influence and reinforce each other (Fig. 1). For example, low self-forgiveness in individuals with depression might lead to low forgiveness of others (Chung, 2016), resulting in increased altruistic punishment of unfair offers in experimental economic games (Pulcu et al., 2015). Likewise, depressed individuals struggle to accurately identify subtle changes in the facial, vocal and bodily expressions of others, and respond excessively to negative emotions and body postures while ignoring positive ones. This can lead to decreased empathy and, consequently, reduced prosocial behavior (Decety et al., 2016).

2. Alterations of self-focused social cognition

Emotion-expressive behavior plays an important role in facilitating social interactions (Gross, 2002). The ability to perceive and control emotions in social situations is a critical skill, especially for depressed patients, because emotional self-control helps prevent, reduce, or shorten the duration or intensity of dysphoric states and negative emotional responses to social encounters (Berking et al., 2014). Dysphoric states may possibly contribute to the reoccurrence of depression by reactivating depressive thinking patterns (Jarrett et al., 2012).

Research on emotion regulation has shown that people do not passively experience their affect (i.e., it is not an automatic process). Instead, individuals appraise their affective states, actively respond to them, and often try to modify them using emotion regulation strategies (Ellsworth, 2013). These strategies help individuals maintain a sense of control in distressing social situations, though they require the individual to have emotion awareness and emotion regulation goals (Gross and Jazaieri, 2014).

Different emotion regulation skills have different effects on mental health and depressive symptoms. For example, *ruminative self-focus* and *emotional suppression* are emotion regulation strategies that are less likely to effectively regulate affect, and they can often cause heightened physiological arousal (Gross and John, 2003). In contrast, adaptive emotion regulation strategies such as *cognitive reappraisal, self-acceptance* and *self-compassion* are positively associated with indicators of health

Fig. 1. This figure illustrates the interplay of social processes in Major Depressive Disorder (MDD), highlighting how impairments in social emotion regulation, social cognition, and interpersonal behavior can impact social functioning.

and well-being.

Most depressed patients struggle to use adaptive emotion regulation strategies; they respond to negative mood induction using less effective emotion regulation strategies than non-depressed individuals (Ehring et al., 2010; Liverant et al., 2008). A recent study using an oddball paradigm, in which a few target stimuli are randomly embedded within a stream of repetitive non-target stimuli, showed that the brain of depressed participants seems to be wired for self-referential processing and rumination instead of socio-emotional cognitive processing. These neural tendencies may explain the sensory overload often perceived by individuals with MDD (Koeppel et al., 2021). Even in a non-clinical sample, individuals who used suppression and rumination strategies more frequently than reappraisal and self-disclosure strategies demonstrated more severe symptoms of depression and anxiety (Garnefski and Kraaij, 2007, 2006; Gross and John, 2003). Importantly, the habitual use of adaptive emotion regulation strategies has been shown to positively influence the outcome of depression treatment (Berking et al., 2008). In one study, MDD patients who struggled to stabilize their mood in aversive circumstances experienced less improvement in subsequent cognitive behavioral therapy (Cohen et al., 2005).

2.1. Increased ruminative self-focus

Egocentric rumination is a form of self-referential processing characterized by recursive repetitive thinking, where an individual self-focuses on negative mood states, depressive symptoms, and past and future events (Nejad et al., 2013; Nolen-Hoeksema et al., 1993). Ruminative self-focus increases the risk of depression, the severity of depressive symptoms, and the frequency and duration of depressive episodes (Nolen-Hoeksema et al., 2008). This pattern of thinking has also been associated with the worsening of negative mood states, greater affective responses to negative material, and increased access to negative memories (Cooney et al., 2010; Watkins and Teasdale, 2001). Even after MDD remission, individuals who display high levels of rumination have a higher risk of depressive relapse (Roberts et al., 1998).

Egocentric rumination can have a substantial negative effect on social relationships. In social contexts, pronounced egocentrism in depressed individuals might therefore lead to low cognitive flexibility (i.e., the inability to consider other people's perspectives or reason in other-centered ways). This, in turn, results in low-quality social interactions and reinforces negative self-views (Deveney and Deldin, 2006; Erle et al., 2019; Johnco et al., 2014). Egocentric rumination can also negatively affect social problem-solving abilities (Ciarrochi et al., 2003; Watkins and Baracaia, 2002).

Following a social interaction, individuals with high rumination tendency constantly ponder about social issues, experience repetitive thoughts about subjective experiences, including self-appraisals and external evaluations of partners (Kuster et al., 2012). This type of

reflection is referred to as post-event rumination. Post-event rumination has been shown to be uniquely associated with social anxiety (Abbott and Rapee, 2004; Hagen et al., 2020; Mellings and Alden, 2000; Rachman et al., 2000), particularly in individuals with elevated depressive symptoms (Kashdan and Roberts, 2007). Because individuals who engage in ruminative post-event processing tend to avoid social situations that are similar to the one that initiated the rumination, ruminative self-focus might support a propensity for social avoidance and disengagement from other activities. In turn, withdrawal from social situations can have detrimental intra- and interpersonal consequences (Rachman et al., 2000).

Several theories have been proposed to explain increased rumination in MDD patients. For example, egocentric focus might result from reduced inhibition of negative information (Joormann and Gotlib, 2010) and elevated preoccupation with rigid, negative self-views (Baron and Hanna, 1990; Erle et al., 2019). A survey-based study found that the benefits of rumination included increased self-awareness and understanding of depression, as well as an increased ability to solve problems and prevent future mistakes (Watkins and Baracaia, 2002). Interestingly, it has been shown that hope plays a moderating role between rumination and depression. Thus, for individuals with high levels of hope, even a high rumination tendency does not aggravate depression (Sun et al., 2014).

Rumination and an increased negative self-focus have been associated with changes in activity within regions of the default mode network (DMN). DMN regions show high activity when individuals ruminate or direct attention internally (Zhou et al., 2020a) and low activity during focused attention on the external environment (Anticevic et al., 2012). Patients with MDD fail to reduce DMN activity while reappraising negative emotional information (Sheline et al., 2009). Importantly, decreased deactivation in the DMN during emotional tasks in MDD patients correlated with depression severity (Grimm et al., 2009). In line with it, patients who exhibited stronger DMN suppression during emotion processing were more likely to show antidepressant response after 2 weeks of treatment (Spies et al., 2017).

2.2. Increased expressive suppression in social interactions

Depressed and dysphoric patients who engage in ruminative processing are also more likely to use another maladaptive emotion regulation strategy known as expressive suppression (Liverant et al., 2008). Expressive suppression (note that this is distinct from thought suppression) refers to the inhibition of emotional expressions by inhibiting outward social responses (Dryman and Heimberg, 2018). Compared to healthy controls, dysphoric individuals report greater spontaneous use of emotion suppression in various situations, such as after watching a sadness-inducing film clip (Quigley and Dobson, 2014). The likelihood of someone suppressing the expression of both positive and negative emotions in social interactions is positively correlated with the severity of their depression (Bedwell et al., 2019; Joormann and Gotlib, 2010).

Expressive suppression is a relatively late step in the process of emotion regulation; it does not decrease the subjective and physiological experiences of negative emotion, but rather modifies the behavioral aspect of the emotional responses. This strategy requires laborious self-management of emotional responses and therefore depletes cognitive resources that could otherwise be used for functional social interactions. Furthermore, negative views and emotions might linger and accumulate without being resolved, creating a discrepancy between inner experiences and outer expressions that can lead to sadness or anxiety (Kalokerinos et al., 2015). The resulting impression of inauthenticity makes establishing emotionally close relationships more difficult and contributes to avoidant and anxious relational behaviors (John and Gross, 2004). Using expressive suppression to regulate the internal emotional response in social relationships also enhances the physiological responses associated with these emotions (Gross, 2001).

Importantly, expressive suppression can decrease the expression of both negative and positive emotions, thereby masking social signals that would otherwise be available to social interaction partners. Less sharing of both negative and positive emotions might, in turn, weaken close relationships (Gross and John, 2003) and, in the long run, decrease relationship satisfaction. (Brewer et al., 2016; Cameron and Overall, 2018). Furthermore, individuals who frequently employed expressive suppression as an emotion regulation strategy demonstrated poorer memory for social information (Richards and Gross, 2000) and were more distracted during conversations (Butler et al., 2003). It is therefore not surprising that, after speaking to an unfamiliar conversation partner who used expressive suppression, participants in one study reported feeling less rapport with their partner, less liking for their partner, and less desire for a future interaction than they reported after speaking to people who did not use expressive suppression (Butler et al., 2003).

The constant monitoring of facial expressions and vocal signals during expressive suppression requires extensive cognitive resources. This reallocation of cognitive resources could make the emotion-suppressing individual more distracted and less responsive to the emotional cues of their partner in casual conversations. One study demonstrated that interacting with a partner who showed little positive emotion, and who was unresponsive to emotional cues, was more physiologically activating (measured as an increase in blood pressure) than interacting with a partner who showed more positive emotion and responded to emotional cues (Butler et al., 2003). Individuals who use expressive suppression are therefore more likely to report receiving less social and emotional support from their peers, and their peers are more likely to report feeling less close to them (Gross and John, 2003).

2.3. Insufficient use of social-cognitive reappraisal

Cognitive reappraisal is an adaptive emotional regulation method that involves re-interpreting an emotion-eliciting situation in a way that enhances or reduces its emotional impact (Buhle et al., 2014). Unlike expressive suppression, which is a response-focused strategy that only activates after an emotion has emerged and behavioral responses have been generated, cognitive reappraisal is an antecedent-focused strategy that occurs before complete activation of the emotional response. Thus, employing cognitive reappraisal can modify the entire temporal course of the emotional response, resulting in interpersonal behavior that is appropriately focused on social interaction and is perceived by the others as emotionally engaging and responsive.

Insufficient social-cognitive reappraisal can lead to seeking reassurance in a socially stressful event because individuals who lack effective coping strategies may attempt to manage their anxiety by seeking validation from others. This behavior may stem from a belief that others hold the key to their self-worth and social acceptance. For example, if an individual is experiencing social anxiety in a new social situation, they may begin to doubt their social skills or likability. In the absence of effective coping strategies such as social-cognitive reappraisal, they may seek reassurance from others in an attempt to reduce their anxiety and validate their self-worth. However, if they are unable to gain reassurance or receive negative feedback, this may exacerbate their anxiety and lead to a self-fulfilling cycle of negative social feedback and rejection. Moreover, insufficient social-cognitive reappraisal can contribute to a pattern of negative social feedback and rejection because the individual may come across as insecure or needy, which can alienate others and lead to social rejection. This can further reinforce the belief that others hold the key to their self-worth and perpetuate the cycle of seeking reassurance.

Individuals with current MDD cases reported less frequent use of cognitive reappraisal than individuals with remitted depression and non-depressed controls (D'Avanzato et al., 2013; Hori et al., 2014). A recent study of older women correspondingly showed that greater use of cognitive reappraisal is related to less severe symptoms of both anxiety and depression (Preston et al., 2021). In school-aged children, the tendency to use cognitive reappraisal was similarly associated with fewer

depressive symptoms (Ni et al., 2022).

Studies have shown that individuals who voluntarily change their interpretation of a situation also change the intensity of their emotional reaction (Ochsner et al., 2004, 2002). For example, people who use cognitive reappraisal to regulate their emotions (Gross, 2001) experience less post-event-rumination and social anxiety after social events (Maeda et al., 2018). Individuals who habitually use cognitive reappraisal also report higher social satisfaction, closer relationships, as well as increased willingness to share emotions, and others perceive them as more likable (Cutuli, 2014; Gross and John, 2003).

Furthermore, cognitive reappraisal can moderate the relationship between stress and depressive symptoms. For example, under heavy stress, women with high cognitive reappraisal ability exhibited fewer depressive symptoms than women with low cognitive reappraisal ability (Troy et al., 2010). Studies in both clinical and non-clinical samples have demonstrated that less frequent use of cognitive reappraisal predicts greater depression severity (Dryman and Heimberg, 2018; Garnefski and Kraaij, 2006; Joormann and Gotlib, 2010). It has been shown, that individuals who invented particularly harmful ideas for damaging others after negative anger-eliciting social situations generated fewer cognitive reappraisals, displayed less problem-oriented thinking during reappraisal and reported more depressive symptoms (Perchtold-Stefan et al., 2021). Conversely, more frequent use of cognitive reappraisal reduced negative affect and minimized other socioemotional costs, such as heightened arousal (Urry, 2009). Further, habitual reliance on cognitive reappraisal after aversion-eliciting events, such as receiving negative feedback, has been shown to improve performance in completing a mental rotation task in individuals suffering from depression (Fladung et al., 2010). Reframing negative events to view them as neutral or positive can lead to positive information bias, which can trigger friendly social behaviors and counteract depression (Harmer et al., 2003).

2.4. Low self-acceptance

Cross-sectional self-report studies of MDD patients suggest that the severity of depressive symptoms is lower in patients who self-soothe when experiencing negative emotions (Gilbert et al., 2006) and who accept, tolerate, or adaptively modify these emotions (Campbell-Sills et al., 2006; Kassel et al., 2007). Indeed, self-acceptance has a positive effect on emotion regulation: high levels of self-acceptance are associated with increased positive emotions (Jimenez et al., 2010), and low levels of self-acceptance are associated with depression (Chamberlain and Haaga, 2001; Flett et al., 2003). Mindful self-acceptance requires a non-judgmental regard for past, present and future aspects of the self, whether good or bad (Ryff and Singer, 1996). Emotion-focused acceptance involves openness to internal affective experiences and a willingness to remain in contact with these experiences, even if they are painful (Campbell-Sills et al., 2006).

High levels of self-acceptance are also associated with higher self-esteem (Chamberlain and Haaga, 2001), which, in turn, positively predicts social acceptance and regulates affect and behavior in social interactions (Donnellan et al., 2005). Conversely, low self-esteem is associated with depression (Orth and Robins, 2013). One explanation for the relationship between self-esteem and depression is that low self-esteem enhances fear of negative social evaluation, leading to social avoidance and thus to depressive symptoms (Ottenbreit et al., 2014). Alternatively, individuals with low self-esteem might feel undeserving of positive outcomes and therefore dampen their positive affect (Wood et al., 2009). Studies have also shown that low self-esteem increases vulnerability to negative self-evaluation and other negative moods, such as shame (Gilbert and Procter, 2006; Porter et al., 2019). Finally, low self-esteem can drive a tendency for social comparison on social media, which can also enhance depressive symptoms (Cramer et al., 2016).

2.5. Low self-compassion

Self-compassion is another important protective factor against mental health problems (Muris, 2016), including depression (Ford et al., 2017). Self-compassionate individuals perform better on the social functioning scale (Allen et al., 2012), behave more altruistically, feel more satisfied with their interpersonal relationships (Neff and Beretvas, 2013), and are more willing to forgive other people's mistakes (Neff and Pommier, 2013). It has been agreed that the lack of forgiveness is emotionally harmful, and can lead to resentment, bitterness, hostility, hatred, residual anger, fearfulness, and depression (Lichtenfeld et al., 2019). Self-compassion can be viewed as a useful emotional regulation strategy, in which painful feelings are not avoided but are instead held in awareness with kindness and understanding, allowing individuals to experience various positive emotions (Neff, 2003). In line with it, self-compassion has been shown to buffer the lack of forgiveness of others on development of depressive symptoms (Chung, 2016).

The concept of self-compassion has been a cornerstone of Buddhist thinking for hundreds of years, but it is a relatively new construct in Western psychology (Neff, 2003). Being self-compassionate is closely related to being open and responsive to one's own suffering (Gilbert, 2009). Self-compassion is also related to a broader awareness that one's experiences are part of the universal human experience. This awareness correspondingly fosters an understanding and nonjudgmental attitude towards one's own imperfections and failures (Cleare et al., 2018). Notably, self-compassion is distinct from self-pity or self-directed feelings of sadness and grief (Stöber, 2003). Self-pity is a result of self-centeredness, and it leads to alienation from social groups and rumination about one's own problems.

Self-compassion significantly predicts changes in depression symptoms; in a five-month longitudinal study of depressed patients, higher levels of self-compassion at baseline were associated with greater reductions and/or smaller increases in depression symptoms (Raes, 2011). By facilitating the use of explicit cognitive reappraisal (Diedrich et al., 2016, A. 2014; MacBeth and Gumley, 2012) and decreasing the use of rumination (Krieger et al., 2013), self-compassion can reduce the intensity of negative affective states in depression. Furthermore, self-compassion could reduce self-criticism and, correspondingly, reduce the likelihood that depressive symptoms recur or persist (Schuling et al., 2020). Individuals who demonstrate more self-compassion are also less likely to fear receiving compassion from others (Gilbert et al., 2014) and therefore less susceptible to the depressive effect of self-criticism (Hermanto et al., 2016). The ability to be open to compassion and support from others might further protect against depression, as individuals with greater social support are less susceptible to the depression-inducing effects of stress (Wang et al., 2014).

Self-compassion is also tightly linked with compassion for others (López et al., 2018), which is driven by feelings of kindness and concern, a nonjudgmental attitude, and an understanding of situations that cause suffering (Neff, 2003). Self-compassionate individuals therefore view the similarities between their own and someone else's experiences through a less self-evaluative or self-critical lens. This more outward-focused perspective enhances their emotional empathy. Overall, these individuals are more tolerant and accepting of other people's behavior, and they attempt to understand emotions in order to approach them rationally and control them (Leary et al., 2007; Neff, 2003; Neff et al., 2005). Fostering self-compassion could consequently have a positive effect on long-term social functioning in depressed individuals by enhancing their ability to tolerate undesired emotions in negative social interactions (Diedrich et al., 2017).

Despite these various connections to depression, there is only limited research on the direct relationship between self-compassion and depression. A longitudinal study investigating the relationship between dispositional compassion and depressive symptoms found that high levels of dispositional compassion in a non-clinical sample of

adolescents and young adults predicted fewer depressive symptoms (Saarinen et al., 2019). Interestingly, another study indicated that experiencing depressive episodes may promote future displays of compassion, presumably by inducing post-traumatic growth and empathy for the suffering of others (Neugebauer et al., 2020). However, a third study showed that depressed patients experience reduced compassion toward close others, though not towards strangers or humans in general (Frick et al., 2021). This last result was possibly due to the study subjects' reduced connectedness with their family members, which, according to patient self-reports, might have been caused by exposure to emotional abuse or neglect during childhood.

2.6. Low social-cognitive flexibility

To evaluate social situations, individuals must be able to inhibit or disengage from a social emotional event, shift their attention between different perspectives, and flexibly adopt new situations or strategies. This skill, called cognitive flexibility, is specifically defined as the ability to detect an interpersonal conflict and to choose effective and adaptive strategies for overcoming it (Fink et al., 2017; Rubin et al., 2014). Social-cognitive flexibility is crucial for generating novel (i.e., creative) ideas (Malooly et al., 2013; Weber et al., 2014) that help successfully resolve social conflicts (Fujino et al., 2017; Milders et al., 2008). Moreover, it requires considering multiple facets of a situation and incorporating social cues acquired over time to provide a more precise understanding of the current context. This process of integrating diverse forms of social information results in balanced interpretations that allow an individual to match their responses to the needs of each situation, thus increasing their resilience (Mehu and Scherer, 2015).

Individuals with less cognitive flexibility are more likely to have an elevated negative affect and an exacerbated cortisol response following an acute social stress (Gabrys et al., 2018). Furthermore, individuals with less cognitive flexibility exhibit increased depressive symptoms, partly because these individuals engage less frequently in problem-focused coping and instead use emotion-focused methods. A recent study showed that individuals experiencing more severe depression struggled to use novel positive information to adjust their initial negative emotional interpretations (Everaert et al., 2018).

Cognitive flexibility is also related to cognitive creativity, or the ability to freely generate new ideas and optimal solutions. The actual process of generating new ideas is called divergent thinking and is negatively correlated with depressive symptoms (Liknaitzky et al., 2018). For example, relative to healthy controls, depressed patients generated lower quality of solutions that were both socially sensitive and practically effective in response to the written presentation of difficult interpersonal situations (Thoma et al., 2015). Thus, there seems to be a specific association of cognitive flexibility with the ability to generate optimal solutions in interpersonal contexts.

2.7. Bias for negative social perception

Relative to healthy individuals, depressed patients are more attentive to negative social stimuli and less attentive to positive stimuli (Disner et al., 2017; Peckham et al., 2010). For example, a recent study demonstrated that patients with lifelong depression were slower to identify surprised faces (Baruch et al., 2021). In many laboratory studies, clinically depressed participants have shown preferential attention to sad faces and words (Feurer et al., 2020; Gotlib et al., 2004; Klawohn et al., 2020; Lazarov et al., 2018; Mogg and Bradley, 2005). Another study measured patient focus using an eye movement paradigm and found that, compared to non-depressed controls, depressed patients showed more attentional bias towards pictures showing interpersonal aggression than towards pictures showing neutral interpersonal interactions (Rantanen et al., 2021).

Social interactions rarely come with objective evidence of whether they were positive or negative, leaving the ultimate interpretation of social situations up to each person's perceptions. Individuals with depression are more likely to not only evaluate ambiguous social interactions as negative, but also to attribute these negative outcomes to themselves (Joormann et al., 2015; Wisco and Nolen-Hoeksema, 2010). Negative social information-processing biases in depressed patients, such as the tendency to evaluate face-to-face social interactions as less positive (Nezlek et al., 2000), decreases the probability that the patient will perceive cues of acceptance and belonging in their social interactions. This can cause depressed individuals to underestimate their social partner`s commitment to an interaction and to overestimate displays of negative behavior (Overall and Hammond, 2013). This negative bias, together with delayed disengagement from negative signals, may explain why depressed individuals fear negative social experiences and therefore have less desire to be involved in social interactions (Rice et al., 2011).

Interestingly, multiple studies have suggested that depressed and heathy individuals do not differ in their initial response to negative social events, but rather in their ability to disengage and recover from these situations (De Raedt and Koster, 2010; Gotlib and Joormann, 2010). Thus, once their attention has been captured by negative information, depressed individuals struggle to disengage from further processing this material, leading to a sustained negative affect and persistent reduction in positive affect (Joormann and Gotlib, 2010; Peckham et al., 2010; Schreiber et al., 2012; Unruh et al., 2020). In the social domain, this inability to disengage from and stop processing negative signals persists even when the context changes from a negative to a more balanced social feedback (Sanchez et al., 2017).

2.8. Pronounced social anhedonia

Social rewards are particularly important motivators for social interactions, as social encounters can improve feelings of self-worth and importance through the praise and attention of others and feelings of interpersonal closeness (Hill, 1987). Previous research has shown that, compared to healthy controls, depressed patients demonstrate more social anhedonia (Olsen et al., 2015), which is defined as the loss of interest or pleasure in social interactions and experiences that were previously enjoyable (Blanchard et al., 2001). In addition to being associated with depression severity and the melancholic subtype of MDD (Atherton et al., 2015; Pelizza and Ferrari, 2009; Rey et al., 2009), social anhedonia is believed to predict non-responsiveness to antidepressants (Gorwood, 2008) and psychotherapy (Hasler et al., 2004b).

Anhedonia has been called an endophenotype of depression and is related to dysfunction in brain reward pathways (Hasler et al., 2004a). For example, a recent study demonstrated an association of depressive symptoms with deficits in both the reward anticipation and reward consumption stages, particularly for social rewards (Zhang et al., 2020). In line with it, individuals with more severe depressive symptoms showed diminished pleasantness responses to both positive and neutral social-evaluative videos during a virtual ball tossing game (Reichenberger et al., 2017). In other words, depressed individuals are less able to 'profit' from positive or neutral (i.e., ambiguous) social interactions. Furthermore, a recent study found that depressed patients gave lower affective ratings in social situations, particularly in response to positive emotions (Guhn et al., 2020). Another study showed that depressive symptoms lead to emotional insensitivity, measured as weaker responses to extremely positive and negative words (Imbault and Kuperman, 2018). This lack of reciprocal positive and negative feelings, referred to as a "flattening of affect," is symptomatic of depression. It reduces the desire to engage in social contacts and results in social withdrawal and avoidance (Kupferberg et al., 2016a). Social withdrawal, in turn, decreases the probability of exposure to future positive social feedback and thus promotes and maintains depressive symptomatology (Rubin et al., 2009).

Social disengagement in depressed individuals may also arise from deficiencies in the ability to learn from social outcomes. One study on

this topic reported that subjects who demonstrated more uncertainty about (and therefore less learning from) the social outcomes they observed were less motivated to engage in pleasant social activities in their own life (Frey and McCabe, 2020). As mentioned earlier, social withdrawal contributes to a vicious circle in which depressed subjects who are uncertain about social encounters reduce their exposure to the situations in which social outcome contingencies can be learned, thus fueling their social uncertainty.

Results from an electrophysiological study using a virtual ball tossing game "Cyberball" indicated that interpersonal problems in depressive patients resulted mainly from deficits in processing pleasurable social stimuli, such as social inclusion, rather than from increased sensitivity to aversive social cues, such as social exclusion (Zhang et al., 2017). This blunted neural response to social rewards (Olino et al., 2015; Pegg et al., 2019) might make depressed individuals less responsive to participation in positive social activities (Setterfield et al., 2016). For example, due to their low self-esteem and feelings of worthlessness, depressed individuals may feel that they do not deserve positive feedback and therefore dampen their positive mood in response to positive evaluations (Wood et al., 2003). Alternatively, because negative self-views are incongruent with positive evaluations, depressed individuals may strive to inhibit their positive emotions (Swann Jr. and Brooks, 2012).

How individuals respond to social rewards might be more relevant than how they respond to monetary rewards for predicting specific features of depression, such as social withdrawal and anhedonia (Forbes and Dahl, 2012; Silk et al., 2012). For example, a recent study found that symptoms of depression were related to diminished perceived importance of positive social feedback, while controlling for monetary rewards (Ait Oumeziane et al., 2019).

3. Alterations in other-focused social cognition

People tend to use their interpersonal networks to help regulate their emotions and affective states, particularly in the absence of a romantic partner (Cheung et al., 2015). Correctly interpreting important social information is a crucial part of successful interpersonal interaction; however, accurate interpretation requires the synthesis of a broad range of verbal and non-verbal cues, including facial expressions, prosody in speech, body language, and the mental states of others (i.e., theory of mind). Social cognitive deficits in MDD patients are correlated with the severity of their symptoms, suggesting that general depression symptoms might interfere with the perception and interpretation of social information (Air et al., 2015).

3.1. Dysfunctional social emotion recognition

Being able to recognize facial emotions is an aspect of empathy and a basic requirement for understanding social interactions. Numerous studies have assessed facial emotion recognition in MDD patients and consistently shown that negative perceptual bias is positively correlated with the severity of depressive symptoms (Bilderbeck et al., 2017; Bourke et al., 2010; Lee et al., 2016; Münkler et al., 2015a; Surguladze et al., 2004). In other words, severely depressed individuals interpret emotionally ambiguous information more negatively than their mildly or moderately depressed counterparts (Lee et al., 2016). For example, depressed individuals are more likely to misinterpret happy faces as neutral and neutral faces as sad (Leppänen et al., 2004). Overall, depressed individuals are more sensitive to negative emotions, less accurate at identifying positive emotions, and more likely to interpret neutral stimuli as negative. In adolescents with MDD, impairments in emotion recognition might predict worse long-term outcome (Dror et al., 2021).

People process a wide range of emotional stimuli in their everyday life, many of which are mild. However, individuals with depression seem to exhibit attenuated reactivity to both positive and negative emotional stimuli (Rottenberg et al., 2005). In other words, other people must display emotions significantly more intense, so that depressed patients can correctly identify, for example, happy expressions as happy. This is true in acute stages of depression (Csukly et al., 2009; Joormann and Gotlib, 2006; Münkler et al., 2015b; Surguladze et al., 2004; Yoon et al., 2009) and in patients in remission (LeMoult et al., 2009). Thus, although depressed subjects showed very good recognition accuracy for sad faces, they were less accurate when interpreting emotional expressions of subtle intensity (Gollan et al., 2010). Further, along with increasing depressive symptoms, recognition accuracy increased for sad faces, but decreased for surprised faces. One possible reason for why depressed subjects require greater intensity to correctly recognize emotional expressions is their lower confidence at recognizing emotions incongruent with depression (Fieker et al., 2016). This biased emotion recognition in MDD patients potentially results from their inability to detach from their own egocentric state (which is often negative) to empathically relate to the emotional state of others, especially if that emotional state is incongruent with the patient's (Hoffmann et al., 2016). For example, patients with acute and remitted MDD are less confident at recognizing happiness and anger than healthy controls (Zwick and Wolkenstein, 2017). Of the six "basic" emotions (anger, disgust, fear, happiness, surprise, and sadness), sadness appears to be the only emotion for which depressed individuals do not demonstrate impaired recognition (Dalili et al., 2015).

Impaired emotion recognition in MDD patients can have negative consequences for their social interactions. It can also affect their decision-making, which can have additional consequences on the quality of their social interactions and other social outcomes (Scheele et al., 2013). For example, participants with late-life depression and poor facial affect recognition were more hostile and had smaller social networks, evidenced by poorer communication with family and fewer close friends, relative to depressed patients with greater affect recognition (Szanto et al., 2012). Individuals with impaired emotion recognition may respond inappropriately to emotional stimuli during social interactions, which can evoke negative reactions from others and thus lead to social rejection and reduced social support.

3.2. Low empathy and high emphatic distress

Empathy is a multidimensional construct that involves both affective and cognitive processes (Schreiter et al., 2013a). Emotional empathy, also known as affective empathy, refers to the ability to feel what another person is feeling. In contrast, cognitive empathy refers to mental perspective taking, or the ability to recognize and understand what another person is feeling (Thoma et al., 2011). Both cognitive and affective empathy seem to be affected in depressed patients (Cusi et al., 2011; Salo et al., 2020), and the degree of impaired affective responsiveness correlates with depression severity (Donges et al., 2005).

Cognitive empathy strongly overlaps with the concepts of affective theory of mind, mentalizing, and emotion recognition (Bensalah et al., 2016). In depressed patients, deficits in cognitive empathy manifest as poor empathic accuracy and perspective-taking (Domes et al., 2016b; Schreiter et al., 2013a). One example of this is more frequent use of first-person singular pronouns (Brockmeyer et al., 2015). It is crucial for studies of cognitive empathy in depressed individuals to consider that empathy requires inhibiting one's own emotional state and flexibly shifting between own's perspectives and those of others. Thus, in situations where the emotional state of an MDD patient differs from that of others, and inhibition of self-related emotional states is therefore needed, patients exhibit an increased egocentric (i.e., predominantly negative) bias in their empathic judgments (Hoffmann et al., 2016). Interestingly, individuals exhibiting depressive symptoms have an impaired ability to take the perspective of a non-depressed individual but not the perspective of another depressed person (Imbault and Kuperman, 2018). The difficulties that depressed people face in detaching from their own egocentric state to empathically relate to the incongruent emotional states of others might lead to impaired emotion

recognition and, consequently, inappropriate empathic concern (Hoffmann et al., 2016).

It has been shown that MDD patients experience lower empathic concern for others (Cusi et al., 2011) and report less emotional pain when evaluating painful videos (Fujino et al., 2014). Possibly, impairments in affective empathy in MDD patients are caused by higher empathic distress, which is an emotional state characterized by the inability to tolerate the perceived pain or suffering of another (Domes et al., 2016a; Thoma et al., 2015, 2011), and is often accompanied by the desire to withdraw from a painful situation in order to protect one's self from excessive negative feelings (Dowling, 2018). In line with this, it has been shown that induction of sad mood led to a more distressing perception of videos depicting others' pain compared to a neutral mood condition, implying that sadness enhances one's emotional reactivity toward others' distress (Cao et al., 2017). Empathic distress might be a reason why parents with MDD who exhibit depressive symptoms show less affective empathy toward their own children (Salo et al., 2020). More recently, Morgan et al. (2021) investigated the impact of postpartum depression on maternal brain function using near-infrared spectroscopy during in vivo mother-infant interactions. They observed changes in affective and social regions of the brain in mothers experiencing postpartum depression, indicating that the mothers were less able express and regulate their own emotions. However, depressed mothers also allocated more resources to soothing and bonding with their infants, possibly compensating for this emotional dysfunction.

Research on empathy in patients with remitted depression is more limited. In one such study, participants completed a pain empathy task. Compared to healthy controls, unmedicated patients with remitted depression reported experiencing more emotional pain and had reduced brain activity in areas of the brain associated with the processing of emotions and facial expressions (Rütgen et al., 2021). Patients with remitted depression also demonstrated more activity in the right temporoparietal junction, which is associated with the self-other distinction (Quesque and Brass, 2019). In these patients, the temporoparietal junction additionally showed lower connectivity to the anterior insula, indicating a sense of detachment when responding to the negative affect of others (Rütgen et al., 2021). This reduced awareness of the emotions of others, which is characteristic of depression (Donges et al. 2005), may impair an individual's social abilities and lead to misunderstandings in social interactions. Specifically, others may perceive this reduced awareness as low empathic concern (Schreiter et al., 2013b). The resulting misunderstandings can have a negative impact on the quality of a depressed patient's interpersonal relationships (Kronmüller et al., 2011), causing them to socially withdraw from emotional situations in order to reduce personal distress (Dowling, 2018; Seidel et al., 2010).

3.3. Decreased mentalizing ability

The low level of social functioning associated with depression can also be partially ascribed to deficits in mentalizing (Durmaz and Baykan, 2020) and theory of mind (Wolkenstein et al., 2011). Mentalizing is the capacity to reflect on and interpret behavior, both one's own and that of others, based on intentional internal mental states, such as beliefs, thoughts, and emotions. This process of reflection contributes to affect regulation and the formation of stable interpersonal relationships (Fonagy et al., 2002). A recent study has shown that in depressive patients metallization impairment was associated with increased levels of depressive symptoms (Rifkin-Zybutz et al., 2021). Deficits in mentalizing and increased preoccupation with the self (Taubner et al., 2011) reduce the ability to conceptualize and handle the complex emotions of others (Bateman and Fonagy, 2015; Donges et al., 2005).

In contrast to mentalizing, theory of mind specifically refers to the ability to infer information regarding the thoughts, intentions, and feelings of others (Bora and Berk, 2016). Using a semi-structured clinical interview designed to elicit thoughts, feelings, and memories about early attachment experiences, one study demonstrated that depressed female inpatients had a significantly lower capacity for mentalization than healthy controls (Fischer-Kern et al., 2013). In addition, patients with depression performed worse than healthy controls when guessing the intentions of protagonists in short stories (Wang et al., 2008). Because depressed individuals have a compromised ability to recognize subtle nonverbal cues and interpret others' emotions, they may respond inappropriately in social interactions and therefore elicit negative reactions from others (Lee et al., 2005).

Impaired theory of mind has been associated not only with an increased risk for depression (Inoue et al., 2006) but also with the severity of acute and remitted depressive symptoms (Bora and Berk, 2016). A recent meta-analysis of 43 studies indicated a small- to moderate impairment in the theory of mind in individuals with depression (Nestor et al., 2022). In line with it, Zobel et al. (2010) showed depressed patients picture stories of social interactions and found that chronically depressed patients have impaired theory of mind abilities compared to healthy controls. Patients with chronic depression have also reported deficits in understanding the feelings of others and reading their emotions (Mattern et al., 2015; Nejati et al., 2012).

3.4. Increased sensitivity to social evaluation and social rejection

Deficits in empathy and theory of mind abilities, combined with excessive reassurance-seeking, can potentially cause depressed individuals to be rejected more frequently in social situations. Indeed, depressed adolescents are rejected by their peers more often than healthy controls (Joiner, 2001). Moreover, almost 50% of patients with MDD or bipolar disorders experience an increased rejection sensitivity (Ehnvall et al., 2014), which is defined as the tendency for an individual to anxiously or angrily expect and perceive rejection in both overt and ambiguous situations (Zimmer-Gembeck et al., 2016). Compared to healthy individuals, MDD patients have elevated negative feelings (Hsu et al., 2015) and increased distress (Jobst et al., 2015) for a longer time period following social rejection. The emotional hyperresponsivity and maladaptive regulation/reappraisal of negative social evaluative information, often associated with negative self-perceptions and negative information processing biases, is possibly due to a hyperactive neural response of the anterior insula (Jankowski et al., 2018; Kumar et al., 2017) and the amygdala (Kumar et al., 2017).

In patients with bipolar depression, rejection sensitivity predicts future increases in depression symptoms and is related to poorer quality of life and low social support (Ng and Johnson, 2013). Furthermore, rejection sensitivity predicted higher depression scores 6 months after treatment suggesting that rejection sensitivity is an important factor which can affect outcome after inpatient treatment and, therefore, potential relapse after depression (Rubeis et al., 2017). Heightened rejection sensitivity can undermine the quality of social interactions and relationships (Downey et al., 2004) by promoting maladaptive behavioral responses such as emotional withdrawal (Zimmer-Gembeck and Nesdale, 2013), anger, hostility, and criticism (Mackenzie et al., 2014). It has been suggested that highly rejection sensitive individuals may more readily use self-blame, may feel humiliated or angry and possibly revert to social withdrawal, which in turn increases the likelihood of being rejected by others (Rubeis et al., 2017).

Pronounced rejection sensitivity can lead to an increased ruminative focus that persists even six months after an initial rejection (Pearson et al., 2011). After social events, depressed individuals often engage in ruminative thought processes targeted at evaluating whether they made critical social blunders and to what degree they achieved acceptance by others (Kashdan and Roberts, 2007). The negative experiences often trigger self-devaluation; strengthen negative beliefs about the self and others; cue memories of previous, negatively valenced social experience; and increase anticipatory anxiety for future social interactions (Rapee and Heimberg, 1997). Rumination could potentially be an adaptive strategy that allows an individual to reassess alternative actions and choices that could maximize their acceptance in subsequent social

interactions (with either the same or new partners); however, by focusing their attention on fears of being evaluated negatively or rejected, depressed individuals may instead discourage proactive behavior and their desire to connect with others.

Two recent studies of social rejection found that rejection sensitivity mediates the relationship between low self-esteem and depression in early adolescents (Zhou et al., 2020b) as well as the relationship between social-interpersonal stressors and depressive symptoms (Wang et al., 2020a). In another study, rejection sensitivity was associated with increased attention for sad faces when participants were socially rejected (Kraines et al., 2018). This increased attention to depression-relevant information in the context of interpersonal rejection may be a mechanism by which rejection sensitivity increases the risk of depression.

3.5. Increased tendency for social comparison

A recent meta-analysis of clinical populations suffering from depression and anxiety reported that social comparisons likely play a significant role in the development and maintenance of anxiety and depression symptoms as well as related cognitions, emotions, and behaviors (McCarthy and Morina, 2020). Social comparison is a cognitive process that can contribute to changes in affect based on how individuals perceive themselves in comparison to their targets. For example, depressed individuals might experience a positive mood change when they are exposed to recovered depression patients (Buunk and Brenninkmeijer, 2001). Social comparison of oneself with others can be directed either downward (i.e., viewing the self as superior) or upward (i.e., viewing the self as inferior) (Wills, 1981), whereby upward comparisons have the most detrimental effects on wellbeing related to depression and anxiety (McCarthy and Morina, 2020).

Recent evidence has suggested that reductions in the frequency of social comparison often precede improvements in depression (Kelly et al., 2007). Conversely, perceiving oneself as lower-ranked in social comparisons is associated with increased depressive symptoms and self-harm, particularly in clinical populations (Wetherall et al., 2019). In other words, individuals with depressive symptoms are more likely to judge themselves negatively relative to others. A questionnaire-based study similarly demonstrated that individuals who scored high on the general tendency to make social comparisons also tended to score high on measures of depressive symptoms (Butzer and Kuiper, 2006). This was especially true if they perceived themselves more negatively than others (Weeks et al., 2009). Major depressive episodes are also more common in individuals who evaluate themselves negatively compared with others (Sturman and Mongrain, 2008). Another recent study found that people who were more likely to show symptoms of depression had a tendency to compare themselves to better off-individuals, post pictures of themselves in social media, and be bothered when they were tagged in unflattering pictures (Robinson et al., 2019). Overall, the fear of being perceived as "worse off" may contribute to the negative emotions experienced by depressed individuals.

Although older studies examining the relationship between social comparisons and depressive symptoms were largely conducted in offline contexts, recent studies have focused on the effects of social networking sites such as Facebook. One study examined the effect of Internet-based social comparison on depression and found that participants who browsed their Facebook "social news feed" reported higher depression levels than participants who browsed a Facebook page with non-social content (Alfasi, 2019). Both the amount of time spent on social networking sites, as well as the frequency with which individuals check their profile, have been associated with depression, with upward social comparisons being the strongest factor driving the association between Facebook use and depression (Yoon et al., 2019).

Facebook users often use their profiles to communicate positive self-portrayals. Especially individuals with high levels of depression tend to perceive attractive Facebook profile owners as happier than themselves; viewing an attractive person on Facebook correspondingly creates fertile ground for envy (Appel et al., 2015). Envy, in turn, is positively correlated with undesirable affective outcomes such as depression (Appel et al., 2016) and low self-esteem (Appel et al., 2015). Interestingly, the tendency to make upward social comparisons on social media platforms has a greater predictive effect for depression in adults with lower marital quality, with envy playing a mediating role. High marriage quality may therefore have a protective effect against depression (Wang et al., 2020b).

In general, individuals with low self-esteem are more likely to make social comparisons with others (Cramer et al., 2016). Thus, low self-esteem drives the connection between passive Facebook use and depressive tendencies (Ozimek and Bierhoff, 2020). In addition to self-esteem, the tendency to ruminate and repetitively focus on one's own distress also contribute to the relationship between making social comparisons on social networking sites and exhibiting depressive symptoms (Feinstein et al., 2013; Yoon et al., 2019).

3.6. Low social trust

Social trust is vital to healthy psychosocial development and to the formation and maintenance of healthy interpersonal relationships (Simpson, 2007). Social trust is defined as a psychological state in which an individual is willing to voluntarily place her/himself in an undefended or vulnerable position based on confident expectations of the good intentions and actions of others (Haselhuhn et al., 2015). Greater interpersonal trust is strongly associated with better communication (Petrocchi et al., 2019) and a higher quality of life (Tokuda et al., 2008). In addition, individuals with higher interpersonal trust had better psychosocial adjustment (Rotenberg et al., 2004). Further, a recent study of college students indicated that social or interpersonal trust mediated the relationship between depression and social anxiety (Yuan et al., 2022).

Previous studies have found that individuals with higher levels of social trust are less likely to experience severe depression symptoms (Betts et al., 2017; Fahmi et al., 2019; Kim et al., 2012). A recent study showed a negative correlation between trust and depressive symptoms (Friðriksson et al., 2021). Further, a study from South Africa found that an individual's level of trust in their physical neighborhood was negatively correlated with their probability of suffering from depression (Tomita and Burns, 2013). Further, adults with MDD engaged in less reciprocity during a trust game than their non-clinical counterparts (Zhang et al., 2012). The trust game typically involves two players, a trustee and an investor, who starts the game with an endowment from which s/he invests some amount in the trustee. This amount is tripled as it is sent to the trustee, who can decide how much of the tripled amount to keep and how much to repay the investor. Thus, the investor's initial investment in the trustee is indicative of trust.

Low social trust is associated with depression partly because individuals with low trust tend to be more nervous around others and more sensitive to rejection (Sharp et al., 2011). Furthermore, individuals with little social trust typically take precautions and show self-protective behavioral reactions to protect themselves from others (Evans and Krueger, 2011; Murray et al., 2011). For example, in romantic relationships, individuals with low trust might distance themselves from their partner in response to doubts about the partner's trustworthiness (Murray et al., 2011). Further, they react to arguments by behaving in a cold and rejecting way toward their partner (Murray et al., 2003) and treating interpersonal conflicts as an excuse to withdraw from the relationship (Campbell et al., 2010). These protective emotions and behaviors reduce the quality of an individual's social interactions and thus promote depressive symptoms. The association between low social trust and depressive symptoms is particularly evident in elderly individuals living in community housing (Han et al., 2018). Individuals who interact with trustworthy neighbors, or who are willing to help their neighbors, may benefit psychologically by feeling a sense of security and acceptance within their community (Fujiwara and Kawachi,

2008). The perceived availability of social capital and social support can also prevent or modulate an individual's negative emotional and cognitive responses to stress.

In psychotherapy settings, the establishment of interpersonal trust between the patient and therapist plays a crucial role. It enhances the patient's perception of being understood and fosters a stronger connection to the treatment process (Ackerman and Hilsenroth, 2003). Recognizing the significance of trust, recent research has emphasized that psychological interventions for depressed adolescents undergoing therapy should specifically address issues of epistemic mistrust in the early stages of treatment (Li et al., 2022). By addressing issues of mistrust early on, therapists can establish a stronger therapeutic alliance and help patients develop a sense of trust in the therapeutic process. This can facilitate a more collaborative relationship between the therapist and the patient and make it easier for the patient to learn and apply new skills both within and beyond therapy.

3.7. Low dispositional forgiveness of others

Individuals who are more forgiving of others tend to have lower levels of depression (Barcaccia et al., 2019; Burnette et al., 2009; Fayyaz and Besharat, 2011; Toussaint et al., 2008) and anger (Fehr et al., 2010) and, conversely, the inability to forgive others is associated with higher depression scores (Maltby et al., 2001). In women who feel unforgiven by others, the ability to forgive others, as well as the self, may be a mechanism of promoting personal well-being and protecting against depression (Ermer and Proulx, 2016). Forgiveness is typically a function of an individual's relationship with the perpetrator and the magnitude of the transgression, such that non-depressed individuals are more likely to forgive closer friends; however, being depressed reduces this tendency to forgive selectively (Tse and Cheng, 2006). In other words, depressed individuals are generally less ready than non-depressed individuals to forgive a mild offense by an acquaintance. Even so, depressed and non-depressed individuals are similarly forgiving when they are either severely offended by an acquaintance or mildly offended by a best friend (Tse and Cheng, 2006).

Forgiveness can occur on cognitive, affective, and behavioral levels and is a choice that the offended can make regardless of the offender's attitudes or behaviors toward the offended (Enright and Fitzgibbons, 2015). Specifically, forgiveness involves accepting what happened, ceasing to be angry, and restoring a positive attitude without forgetting, justifying, or denying the offense or demonstrating moral superiority to the offender (i.e., pseudo-forgiveness). Forgiveness is a proven approach to regulating negative affect (Barcaccia et al., 2018) and thus reducing depression and anger (Akhtar and Barlow, 2018; Enright and Fitzgibbons, 2015). When people genuinely forgive someone who offended them, they demonstrate not only a reduction of angry and resentful emotions, thoughts, and behaviors, but also an increase of positive and benevolent thoughts and behaviors towards the offender (Wade et al., 2014).

Although the cause-and-effect relationship between depression and dispositional forgiveness remains unclear, researchers have proposed several potential theories. First, forgiveness can protect against depression because people who are unable to forgive others tend to harbor their negative feelings of grudge and revenge (Brown, 2003). Thus, the tendency to forgive others may protect against the negative interpersonal experiences and perceptions that contribute to depression.

Second, forgiveness can also decrease someone's motivation to maintain estrangement of their transgressors, reduce their rumination about the misdeeds of transgressors, and help prevent the expression of inappropriate social behaviors such as anger, hatred, or revenge (Fayyaz and Besharat, 2011; Mccullough, 2000). By showing positive social behaviors toward transgressors, people can facilitate the establishment of positive relationships with their transgressors and thus break the vicious cycle in which interpersonal conflicts lead to rumination about interpersonal rejection and, subsequently, depression (Downey and Feldman, 1996). Conversely, being unforgiving could exacerbate negative emotions, causing increased depression and emotional instability. This relationship even has a physiological basis: levels of the stress hormone cortisol are lower in individuals who practice dispositional forgiveness (Berry and Worthington Jr., 2001). Since forgiveness can be fostered in clinical settings, working on forgiveness in psychotherapy or in counselling could decrease adolescent depression and improve well-being (Barcaccia et al., 2019)

A third possible mechanism by which forgiveness may have a positive effect on mental health is by promoting a collectivistic worldview and conciliatory behavior (Watkins et al., 2011), which can improve an individual's social support (Worthington Jr. et al., 2001) and relationship quality. Furthermore, adolescents who are more forgiving may have more functional strategies to effectively regulate and control their anger (Barcaccia et al., 2019). This hypothesis was supported by a study showing that individuals who were more forgiving also had more cognitive skills involved in controlling anger (Wilkowski et al., 2010). Thus, in adolescents, forgiveness belongs to significant protective factors against depression (Barcaccia et al., 2019).

3.8. Negative social attribution bias

It has been shown that poor relationship quality is associated with depressive symptoms (Pieh et al., 2020; Teo et al., 2013), especially in the case of relationships with romantic partners (Beckmeyer et al., 2018; Jaiswal et al., 2016). Individuals with MDD report significantly more negative interactions with their romantic partners than individuals with non-affective psychiatric disorders (Zlotnick et al., 2000). Depressed patients are also more likely to make negative causal attributions about the behaviors of their romantic partner; in other words, they place the cause of or responsibility for negative behaviors in their partner (Wilde and Dozois, 2018). Apart from low dispositional forgiveness, this tendency could be due, at least in part, to the negatively biased self-schema of depressed individuals (Evans et al., 2005) and their associated expectation of similarity between their cognitive self-representations and those of close others. It is therefore not uncommon for individuals with MDD to burden or alienate romantic partners (Benazon and Coyne, 2000) or demand support in a hostile manner (Rehman et al., 2010). Furthermore, regression analyses from a recent study showed that study participants who were more vengeful were also more likely to be anxious and depressed (Barcaccia et al., 2020).

Negative social attribution bias also seems to be present in children with depression. Depressed children who reported blaming others as a strategy when they have a problem show fewer prosocial behaviors such as helping others, sharing, and being considerate of other's feelings (Melero et al., 2021). Specifically, a stronger tendency to blame others linked depression to more conduct problems and less prosocial behavior.

4. Alterations in interpersonal behavior

Individuals with higher levels of depressive symptoms tend to interact less frequently with others and rate their relationships with their interaction partners as less close, compared to their less depressed counterparts (Brown et al., 2011). One study found that for depressed individuals might expect rejection long before a social situation even begins, thus increasing their likelihood of interpreting ambiguous social cues negatively or seeing them as evidence of rejection (Liu et al., 2020, 2014). A more recent study similarly demonstrated that participants with depression had heightened negative feedback expectancy biases during a social decision-making task (Frey et al., 2019). Further, increased levels of depressive symptoms were also related to negative expectancy bias during an online social evaluation experiment (Caouette and Guyer, 2016). The expectation and perception of rejection can promote a negative emotional response, such as anger or anxiety (Normansell and Wisco, 2017), negative social attribution, excessive use of social media and smartphones, and social avoidance (Zimmer-Gembeck

and Nesdale, 2013). The interaction pattern between a depressed person and their family and friends is therefore often marked by periods of emotional distance, negative thinking, and irritability (Mackinnon et al., 2012). On the other hand, depressed individuals are also likely to seek excessive reassurance and confirmation of their worthiness and lovability from others to relieve their self-doubts (Evraire and Dozois, 2011a). These behaviors, when exaggerated, can lead to actual rejection by the peer group, creating a self-fulfilling prophecy and thus facilitating depression (Mor and Inbar, 2009).

4.1. Deficits in anger management

Depressed people feel angry (Cheng et al., 2005) and hostile (Moreno et al., 1993) more often than their non-depressed counterparts. The main form of aggression in depressed patients is impulsivity, which leads to uncontrolled expressions of anger or risky or insulting behavior (Fathan and Daulima, 2021). Indeed, higher levels of anxiety and depression have been associated with higher levels of impulsivity (Yu et al., 2020). There is also a strong link between depression and irritability, and chronic severe emotional dysregulation in childhood and adolescence may predict later depression (Vidal-Ribas et al., 2016). Both phasic irritability (aggressive outbursts) and tonic irritability (irritable mood) predict an earlier onset of a major depressive episode and have been associated with an increased risk of being diagnosed with MDD and having at least one depressive symptom (Liu and Cole, 2021). In addition to their negative effect on interpersonal relationships, impulsivity and irritability also contribute to poor therapeutic outcomes and more depression relapses (Fava and Rosenbaum, 1999).

Studies have suggested that anger in people with depression often stems from narcissistic vulnerability and/or a high sensitivity to perceived or real rejection (Busch, 2009). Because this anger is often directed inwards, it can trigger defensive behaviors such as passive aggression, “acting out,” or projection (Corruble et al., 2003a, 2003b). Furthermore, depressed people tend to use negative emotion words more frequently, particularly in reference to the self (Robbins et al., 2011) and especially in the context of their romantic relationships (Baddeley et al., 2013). This preference for negative emotion words is likely caused by the negativity bias typical of depression.

4.2. Increased social reassurance seeking

Reassurance-seeking behavior is considered to be a central process driving the onset and maintenance of depression (Joiner et al., 1999, 1992; Wakeling et al., 2020) because it predicts interpersonal rejection and the severity of depressive symptoms (Joiner et al., 1992; Starr and Davila, 2008). Excessive reassurance-seeking is the tendency to repeatedly ask others to provide reassurance that one is lovable and worthy, even though others have previously attempted to provide such reassurance (Kraines et al., 2018). For example, MDD patients may excessively seek reassurance from their romantic partners after experiencing stressful events and expect their partner to help them to regulate their feelings and emotions (Katsuya, 2006). In contrast to obsessive compulsive disorder, in which patients seek reassurance primarily about perceived general rather than social threats, depressed individuals tend to seek reassurance about perceived social threats as well as their performance and competence at different tasks (Parrish et al., 2011).

A depressed person’s need for social reassurance creates a harmful vicious cycle: excessive reassurance-seeking increases the likelihood of social rejection and reduces social support, thereby reinforcing negative depressive cognitions and promoting ever-increasing feelings of insecurity that fuel the need to seek additional reassurance. Although social peers may initially provide the support being requested, the depressed person may doubt the authenticity of this support and may therefore be unable to use this positive feedback as reassurance (Evraire and Dozois, 2011a). In response, family members grow tired of the depressed person’s variable mood and become annoyed or burnt out by the need to repeatedly provide reassurance. They will often distance themselves from the depressed person (Rehman et al., 2008a), which can increase the depressed person’s sense of isolation and confirm his or her negative point of view (Sandberg et al., 2002; Whiffen, 2005). Over time, this creates another vicious cycle of negative reciprocal interactions: inadequate interpersonal behavior fosters relationship distress, which only intensifies the inadequate behavior.

In support of these vicious cycles, a recent study demonstrated that excessive reassurance-seeking reduced the number of people in an individual’s social network, which had a corresponding negative effect on well-being (Abe and Nakashima, 2020). However, this effect was moderated by how well the depressed individual was accepted by their romantic partner: when the partner`s acceptance was high, the negative effects of reassurance-seeking behavior on well-being via the size of the social network were not observed. In these cases, the acceptance by the significant other presumably provided the depressed individual with trust and intimacy and prompted adaptive emotion regulation, thereby protecting the depressed individual from the perception of being a burden (Hames et al., 2015).

4.3. Increased altruistic punishment

The tendency to punish people for unfair, non-cooperative behavior is a hallmark of human bargaining. This punishment for violating social norms, if it is particularly costly, is referred to as “altruistic punishment” Altruistic punishment can be measured by observing people playing the “ultimatum game,” in which players evaluate the fairness of offers of money (Emanuele et al., 2008). In this game, the “proposer” is endowed with a sum of money that they must split between themselves and the “responder.” The proposer chooses what proportion of the money to offer to the responder, and the responder then decides whether to accept or reject the offer. If the responder accepts, each player earns money according to the offer, but if the responder declines, neither player earns anything. Altruistic punishment of unfair behavior occurs when responders reject low offers, a decision that is typically motivated by prosocial preferences for fairness (Emanuele et al., 2008).

When playing as the responder in the ultimatum game, patients with depression tend to reject more unfair offers than non-depressed controls (Radke et al., 2013; Scheele et al., 2013; Y. Wang et al., 2014), even after their symptoms have improved (Scheele et al., 2013). Using an electronic ultimatum game in which affective facial expressions were paired to offers, one study found that depressed patients rejected a significantly higher percentage of offers than healthy controls, even if those offers were extremely fair (Radke et al., 2013; Wang et al., 2014). The rejection rate was positively correlated with the severity of depressive symptoms (Scheele et al., 2013; Wang et al., 2014). One possible explanation for this relationship is that individuals suffering from depression have a heightened sense of unfairness (Hu et al., 2021). Depressed patients may also reject more offers because they have reduced reward sensitivity (Radke et al., 2013) or increased pessimism and self-blame, causing them to focus on the negative associations of unfair offers rather than the potential benefit of accepting them (i.e., monetary reward) (Harlé and Sanfey, 2007; Pulcu et al., 2015).

Further, alterations in mood, such as sadness, were shown be integrated at the neural level to bias decision-making. Thus, in a non-clinical sample, the reduced acceptance rates in depressed individuals were exacerbated in patients who reported a sad mood (Harlé and Sanfey, 2007). Receiving unfair offers while in a sad mood elicited activity in brain areas which are involved in processing of aversive emotional states (anterior insula) and cognitive conflict (anterior cingulate cortex) (Harlé, 2011). Further, sadness was associated with diminished sensitivity in neural regions involved in reward processing (ventral striatum), which is related to social anhedonia.

In addition to a sad mood, other proposed predictors of whether individuals reject unfair offers in the ultimatum game include self-reported anger (Pillutla and Murnighan, 1996) and increased

physiological arousal in response to unfair offers (van't Wout et al., 2005). These impulsive emotional reactions to unfair offers can be observed after experimental serotonin depletion in healthy subjects, but these impulses can be overridden by "swallowing one's pride" and accepting unfair offers to increase monetary gain (Crockett et al., 2010).

4.4. Decreased prosocial behavior

Prosocial (i.e., helping) behaviors are voluntary acts intended to benefit another person (Eisenberg and Fabes, 1998). People typically take pleasure in helping others: this pleasure is one of the main motivating factors to engage in future prosocial behavior (Aknin et al., 2018; Carlson et al., 1988). Previous research has shown that exhibiting more helping behavior increases happiness and life satisfaction (Meier and Stutzer, 2008), which seems to be a protective factor against developing depression (Gebauer et al., 2008).

Adults with MDD typically exhibit less prosocial behavior than healthy controls (Alarcón and Forbes, 2017), which, in turn, has been linked to a depressive mood (Davis et al., 2016; Musick and Wilson, 2003; Setterfield et al., 2016). One study suggested that depressed individuals might be less likely to engage in prosocial behavior because they anticipate less positive responses to social situations due to their increased social anhedonia (Setterfield et al., 2016). This lack of expected enjoyment in social situations, and corresponding social disengagement, may also contribute to the maintenance of depressive symptomatology. For example, a recent study suggested that children who display persistently low levels of reparative behaviors (i.e., prosocial behaviors that people exhibit after offending someone) have an increased risk of poor social and emotional outcomes, including adolescent depression (Donohue et al., 2020). Results of a recent longitudinal study in Chinese children similarly identified an inverse relationship between prosocial behavior and depression (Jin et al., 2021): In other words, prosocial behavior was a protective factor against depression, whereas depression undermined prosocial behavior.

Interestingly, prosocial behavior in depressed patients varies based on whether the patient is currently depressed or in remission (Hofelich Mohr et al., 2016). In one study, participants were asked to interview distressed individuals. Participants with past (i.e., remitted) depression showed an increased prosocial response to the distressed individual, whereas participants with current depression symptoms felt less empathy and provided less emotional and practical support (Hofelich Mohr et al., 2016). The negative self-focus of currently depressed participants may have caused them to attend to their own feelings and needs over the needs of others, thus precluding them from resonating with the distressed interviewee. It is also possible that patients with active depression are less able to perceive how much help another sad individual needs: chronically experiencing sadness or depression may normalize these feelings, so that depressed patients do not view others' sadness as necessitating immediate action. On the contrary, remitted MDD patients can reflect on their prior personal experiences with distress or sadness, allowing them to create more elaborate and empathetic mental representations of the emotional states of others. This capacity for empathetic reflection may be what allows remitted MDD patients to better relate and respond to someone else's distress (Hofelich Mohr et al., 2016).

Cooperative behavior can be experimentally measured by having study participants play the "prisoner's dilemma" game, in which the participant and a co-player independently choose whether to cooperate with each other in a social exchange situation (Gradin et al., 2016). In the beginning of the game, the two players are provided with a single amount of money. Each player must independently decide whether to cooperate (i.e., split the money with their partner) or defect (i.e., steal all the money for themselves). The best outcome for both parties is if they both cooperate, so that they each receive half of the money. If both players defect, neither receives any money. However, an individual stands to earn the most, and walk away with all the money, if they defect and their partner cooperates. Thus, an individual's self-interest conflicts with that of their partner. By having MDD patients play the prisoner's dilemma, studies have shown that MDD symptoms are linked to less cooperation (Surbey, 2011) and difficulty sustaining reciprocal cooperation (Clark et al., 2013; Pulcu et al., 2015). Further, depressed patients made fewer contributions in the public goods game (Clark et al., 2013), which is typically played with four participants. Each of participants is given an initial endowment consisting of a certain number of points and must decide whether to keep the endowment or to contribute a part of it to a public fund, which grows at the rate of each player`s investment and is later split among the players (Clark et al., 2013). Depressed individuals playing the public goods game report more negative feelings (e.g., betrayal and guilt) than non-depressed controls (Gradin et al., 2016), and they behave more aggressively towards partners who betray them. They are also more critical of their own performance after being betrayed (Hokanson et al., 1980).

Trust is essential for productive social interaction and exchange and makes it possible for people to establish socially supportive relationships (Watabe et al., 2015). In contrast to that, reduced trust increases uncertainty and the feeling of diminished control in social decision-making situations (Unoka et al., 2009). Prosocial behavior is likely associated with interpersonal trust, since trust comprises positive expectations about the behavior of others (Fehr, 2009). Individuals may tend to cooperate to fulfill these positive expectations and maintain a positive social reputation.

4.5. Excessive use of social media and smartphones

Although social networking sites such as Facebook, Instagram, and Twitter have surged in popularity over the past decade, to the point where they have become part of daily life (Lenhart et al., 2010), researchers have also expressed concerns about the relationship between social media and depression (Ellison et al., 2007). Smartphone-based social media applications such as WhatsApp, Facebook, and Snapchat are becoming one of the main sources of communication with others and a key means of obtaining social support. As these applications become more popular, face-to-face interactions are gradually being replaced with cyberspace-oriented relationships (Al-Kandari and Al-Sejari, 2020). Thus, although smartphones may have simplified the way people maintain their interpersonal relationships (Cho, 2015) and fulfill their personal and work-related responsibilities (Derks et al., 2015), experimental studies have also shown that people will neglect peers with whom they are physically interacting in favor of connecting to "online others" via their smartphone (Rotondi et al., 2017).

Social media users can engage in social activities with other users; these activities may be either passive (i.e., viewing other users' posts) or active (i.e., creating content and sharing it with other users). The term "Facebook depression" was first coined to describe the development of depressive symptoms following long-term, high-intensity exposure to social networking sites (O'Keeffe et al., 2011). One study defined "problematic social media use" (PSMU) as excessive concern about social media, a strong motivation to use social media, and devoting so much time and effort to social media that it impairs other social activities, schoolwork, job performance, interpersonal relationships, and/or psychological health and well-being (Andreassen and Pallesen, 2014). Although initial measurements of PSMU focused only on Facebook (Muench et al., 2015), researchers have since explored addictive or problematic use of multiple social networking sites or social media in general (Ivie et al., 2020; Vahedi and Zannella, 2019).

A recent study demonstrated that, relative to healthy controls, patients with depression are more addicted to social networking sites (Aydin et al., 2020). Two recent reviews similarly described a small positive correlation between PSMU and depressive symptoms (Ivie et al., 2020; Vahedi and Zannella, 2019). However, this correlation is complex and can be driven by a variety of different factors (Shensa et al., 2017). For example, PSMU may be linked to depression via emotion regulation

(Brandenberg et al., 2019; Wegmann et al., 2015), self-esteem (Liu et al., 2020), or lower emotional intelligence (i.e., the ability to perceive, understand, and manage emotions effectively). Emotionally intelligent people tend to better understand, regulate, and use emotional information to cope with emotional problems, thus reducing the intensity of their stressors and providing a greater sense of control over their environment (Ruiz-Aranda et al., 2014). Conversely, individuals who struggle with emotion regulation might overuse social networking sites to relieve stress or satisfy a need to escape from stressful real-life situations (Arrivillaga et al., 2022; Hussain and Griffiths, 2021). In other words, individuals who struggle to manage emotional situations in their offline everyday lives become more likely to pursue external forms of regulation, and they turn to social media as a maladaptive coping mechanism to relieve their distress (Arrivillaga et al., 2022).

Because most studies of PMSU have used a cross-sectional design, the temporal relationship between PSMU and the onset of depression remains unclear. It is possible that the development of depression leads to social anhedonia and a subsequent tendency to avoid in-person social activities and replace them with virtual interactions. Alternatively, PSMU might increase the risk of depression by replacing in-person activities and enabling social comparison with highly idealized portrayals of life (Tiggemann and Anderberg, 2020). Social networking sites are replete with these unrealistic portrayals of reality, and some users might therefore perceive that other people have higher-quality social relationships. This perception then leads to lower self-esteem and more depressive symptoms (Primack et al., 2017). The use of social networking sites can also further isolate people, especially young adults, from their social environments, and social isolation is another risk factor for depression (Al-Kandari and Al-Sejari, 2020). A recent longitudinal study in a young adults found a strong association between social media use (SMU) and the subsequent development of depression but no increase in SMU after the onset of depression (Primack et al., 2021). In other words, baseline SMU was a risk factor for developing depression, likely because it enhanced social stress, but depression did not increase SMU (Primack et al., 2021).

Facebook users may also compare themselves with others based on the number of "likes" and the types of comments that their statuses and photos receive. These types of upward comparisons can make a user feel worse (Steers et al., 2014). However, individuals with MDD can benefit from positive use of social media, such as searching for social connections (Radovic et al., 2017). For example, individuals who display higher levels of social interaction, such as those who follow >300 people on Twitter or post pictures of themselves with other people, are less likely to have MDD. This correlation possibly exists because intentionally sharing emotions with others can reduce depressive symptoms in times of high stress. Furthermore, SMU might increase a user's perception of social support and buffer the feelings of loneliness and isolation often associated with depression (Grieve et al., 2013). Thus, routine use of social networking sites has been associated with positive health outcomes in depressed patients (Bekalu et al., 2019).

However, addiction to web-based social interaction is also strongly linked to the problematic, compulsive use of smartphones for gaining social satisfaction and compensation (Kuss and Billieux, 2017; Kuss and Griffiths, 2011; Matthews et al., 2009). For example, mobile phone addicts are significantly more likely than non-addicts to experience interpersonal problems, social anxiety, and depression (Alhassan et al., 2018; Chen et al., 2016; Kim et al., 2019). For individuals who use their smartphone often, spending time with friends can seem less valuable in terms of satisfaction and social reward (Rotondi et al., 2017). If a mobile phone addicts have their smartphone with them, even in silent mode, their need to be constantly connected can cause others to perceive them as being "absently present" in face-to-face social interactions (Aagaard, 2016). Further, smartphone addiction is negatively associated with communication competence (Kwon and Paek, 2016) and positively associated with socioemotional distress (Volungis et al., 2020), interpersonal difficulties (Lepp et al., 2014), shyness (Bian and Leung, 2015) and social anxiety (Enez Darcin et al., 2015). As a result, the addicts may withdraw from their immediate relationships (Miller-Ott et al., 2012). In line with it, increasing daily smartphone use has correspondingly been associated with increasing reports of loneliness (Tan et al., 2013). Interestingly, limiting social media use to approximately 30 minutes per day led to significant reductions in loneliness and depression over three weeks (Hunt et al., 2018).

One reason that people excessively check their smartphones might be related to the "fear of missing out" (FoMO). FoMO describes the reluctance to miss important information and rewards, including social information (Li et al., 2020). People who experience FoMO therefore feel the need to stay persistently connected with what others in their social network are doing. Indeed, FoMO appears to drive the overuse of communication technologies such as social media (Alt, 2015; Przybylski et al., 2013) and smartphones (Clayton et al., 2015).

Pathological use of mobile phones by depressive patients might also be driven by excessive reassurance-seeking behavior, which is often caused by post-event rumination. For example, the excessive need for reassurance can cause depressed patients to habitually check their phone for notifications and social reassurance from friends and relationship partners (Billieux et al., 2015). Such reassurance-seeking can also help maintain depression (Evraire and Dozois, 2011b) and anxiety (Cougle et al., 2012; Rector et al., 2011).

Yet another reason why some people are more prone to smartphone addiction might be suboptimal use of emotion regulation strategies. Older studies (Casale et al., 2016; Elhai et al., 2016) and recent work (Fu et al., 2020) have consistently demonstrated that difficulty with emotion regulation is positively correlated with PSMU. In other words, individuals who ruminate as a means of regulating their depressed or anxious affect may be more likely to check their phones more frequently (Oulasvirta et al., 2012), whereas individuals who do not ruminate excessively can cope with depression and anxiety using healthy emotion regulation strategies (Elhai et al., 2018). The latter group is able to engage with their smartphones productively and may use social networking sites to facilitate relationship building without becoming socially isolated (Ellison et al., 2007; Steinfield et al., 2008). For example, data from a recent study in Germany suggested that individuals aged 40 and over who use online social networks daily tend to feel less socially isolated than those who use social networks less frequently or not at all (Hajek and König, 2019).

Interestingly, technology-based social comparison and feedback-seeking have also been associated with depressive symptoms. This association is particularly strong among females (Nesi and Prinstein, 2015), who are more prone to smartphone addiction than males (Kim et al., 2019). The gender gap in smartphone use presumably arises due to the more relationship-oriented nature of females and differences in how males and females use their smartphones. Men primarily use smartphones for work-related purposes, Internet searches, and entertainment, whereas women spend more time using social network platforms to enhance their social relationships (Bianchi and Phillips, 2005).

4.6. Increased social avoidance

Social avoidance plays a crucial role in regulating depression, even after remission, because the tendency to avoid social situations can limit social opportunities and contribute to the maintenance of social difficulties (Ottenbreit et al., 2014; Ottenbreit and Dobson, 2004; Quigley et al., 2017). For example, there is evidence that membership in social groups can protect against future depression, alleviate depression symptoms, and prevent depression relapse (Cruwys et al., 2013). Postmes et al. (2019) performed a meta-analysis of 76 studies encompassing 31,016 individuals to explore the relationship between social identification and depression; they found that individuals who strongly identify with a social group tend to report fewer depressive symptoms. Notably, belonging to a larger number of groups not only reduces the risk of depression in non-depressed individuals but also reduces the severity of

depression symptoms among an initially depressed sample (Cruwys et al., 2013). However, the benefits of social group memberships are more pronounced among depressed vs. non-depressed individuals. For example, the risk of depression relapse is reduced by 24% if depressed individuals join one group and by 63% if they join three groups.

Depressed individuals generally have an increased social avoidance response relative to healthy controls. This has been studied using a computerized social decision-making task, in which the participants had to perform a time estimation task. For completing this task, depressed individuals could choose between a social option (playing in a team with a co-player) and an individual option (playing alone). Although from a material point of view the social option was more profitable, in case of low performance, it could generate the feeling of social comparison and guilt feelings for failing the team. Unsurprisingly, depressed participants chose significantly more often the individual option compared to controls, which resulted in lower gains in this group (Fernández-Theoduloz et al., 2019). In addition to that, depressed participants chose the individual option even more frequently as the task progressed, whereas healthy participants chose the social option more frequently. In their self-reports after completing the task, depressed participants reported higher feelings of shame, higher levels of disappointment following a bad performance in the social option, and less enthusiasm at the prospect of meeting their co-players. Thus, social avoidance in depressed individuals might result from their tendency to avoid possible rejection (Davis et al., 2016). In support of this hypothesis, a recent study found that clinically depressed patients were less likely to take social risks both (i) compared to healthy controls and (ii) relative to non-social risks (Follett et al., 2021).

Social avoidance might also be caused by an increased fear of social comparison, which can trigger negative self-evaluations (Swallow and Kuiper, 1988) and cause individuals to attribute negative outcomes of social interactions to themselves (Gilbert and Procter, 2006). For example, depressed individuals interpret their own actions as embarrassing in social interactions more often than non-depressed individuals (Čolić et al., 2020). Furthermore, social anhedonia might cause depressed individuals to find social interactions less pleasant or mood-elevating. On the other hand, depressed individuals may spend less time in groups because fewer people want to interact with them (Baddeley et al., 2013). Although avoiding interpersonal conflict may prevent the experience of negative outcomes, it also results in the loss of social and material opportunities, prevents the depressed individual from improving their social skills or learning how to deal with interpersonal problems, and may ultimately lead to social isolation (Kupferberg et al., 2016b).

5. Impacts of social impairments on social functioning

5.1. Increased interpersonal stress

According to the "stress generation hypothesis," depressed individuals have a tendency to behave in ways that contribute to the occurrence of negative events in their lives (generate stressful life events) in interpersonal contexts due to their depressive symptoms, their beliefs, expectations, and personal characteristics (Keser et al., 2020). However, this tendency creates another vicious cycle: depressive symptoms increase the risk of experiencing stressful interpersonal life events, which, in turn, increase depressive symptoms (Liu and Alloy, 2010). For example, a recent longitudinal study found that conflict with friends in early childhood was a consistent interpersonal risk factor for subsequent depressive symptoms in late childhood or middle adolescence (Yang et al., 2020)

Major interpersonal stressors often precede depressive symptoms (Muscatell et al., 2009). Elevated levels of interpersonal stress, such as problems with romantic partners, peers, or family, presumably result from a dynamic interplay between personal and environmental variables. These variables could include a high need for affiliation and approval, a compromised sense of self-worth, deficits in interpreting emotions, or low competency at handling interpersonal conflict, among others (Gunthert et al., 2007; Nezlek and Gable, 2001). Importantly, it is interpersonal stress - not other types of stress (e.g., academic) - that is more often associated with a larger increase in depressive symptoms (Flynn et al., 2010; Flynn and Rudolph, 2010; Shih et al., 2006). For example, interpersonal stress predicts the recurrence of depression but chronic non-interpersonal stress (e.g., occupational, academic, or health difficulties) does not, pointing to the dominant role of social functioning in MDD (O'Neill et al., 2004; Parrish et al., 2011; Sheets and Craighead, 2014).

Interestingly, a recent longitudinal study found that not everyone is sensitive to the depressogenic effects of stress (Owens et al., 2019). In that study, severe interpersonal stress predicted future increases in depressive symptoms only for adolescent girls who demonstrated an elevated affective reactivity to stress, which was measured as the increase in cortisol in response to psychosocial stressors. Another study found that adolescents who have more immediate depressogenic reactions to interpersonal stressors may be at a greater risk for developing social anxiety (Hamilton et al., 2016).

5.2. Low social support

Negativity in social interactions is exhibited not only by depressed individuals but also by the people who interact with them more frequently. For example, the romantic partners of depressed individuals make more negative comments in stressful interactions than the partners of non-depressed people (Rehman et al., 2008b). The resulting interpersonal conflicts can lead to reduced social support (Ren et al., 2018; Renner et al., 2012), which is defined as the extent to which an individual can access assistance and resources provided by people in their networks (French et al., 2018). Social support facilitates the ability to cope with stress by providing assistance with daily tasks and a venue for venting feelings.

The literature draws an important distinction between perceived and received social support. Perceived support is a person's subjective feeling of being supported by their relationships, whereas received support refers to the actual support provided. The literature also distinguishes between emotional support, which is often derived from intimate and confiding relationships (e.g., having someone available to listen, offer sympathy, or give advice during times of crisis or hardship), and instrumental support, which includes more tangible or practical assistance (e.g., providing advice or assisting with issues that require physical or financial aid) (Santini et al., 2015). The different forms of social support can have different effects on mental health (Eagle et al., 2019). For example, perceived support is more important for social functioning in depression than received support (Santini et al., 2015), and stronger high emotional support has a more positive effect on depression than instrumental support (Gariépy et al., 2016).

Support from family members is also critically important for preventing or attenuating depression, as individuals who did not have any family support in the past year had a more than three-fold higher odds of developing depression (Werner-Seidler et al., 2017). A recent study similarly demonstrated that individuals with higher levels of depressive symptoms or stress showed lower marital adjustment (Pietromonaco et al., 2022). However, exhibition of positive behaviors by their partners in response to hostility and defensiveness of the depressed individual during social conflicts helped attenuate the harmful effects of personal and situational vulnerabilities on interpersonal relationships. These positive responses include correctly recognizing and interpreting the partner's needs, being willing and able to provide effective care, and showing sensitivity, interest, acceptance, respect, and understanding for the partner.

Importantly, social support is associated with the likelihood of achieving satisfactory mental health after suffering from depression (Fuller-Thomson et al., 2016). Besides leading to a general increase in

depressive symptoms (Domènech-Abella et al., 2019; Levula et al., 2018; Lin et al., 2019), the lack of social support increases vulnerability to stress from negative life events, and is the strongest predictor of depressive symptomology in community-dwelling adults (Miller et al., 2019). Furthermore, low social support predicts a poor response to, and earlier withdrawal from, depression treatment (Trivedi et al., 2005).

Of the various types of social support, emotional support is a critical mechanism through which social participation may protect against depression (Choi et al., 2021). By engaging in diverse social activities, older adults can form social relationships and exchange emotional intimacy with individuals who share similar views, thus increasing their perceived connectedness and decreasing their feelings of loneliness (Park et al., 2013). A recent study of community-dwelling older adults corroborated this hypothesis by showing that more frequent participation in more diverse social activities reduced the risk of depression (Choi et al., 2021).

5.3. Reduced diversity of social contacts and dysfunctional social networks

Longitudinal studies of people's social networks have shown that depressive symptoms can affect the creation, maintenance, and termination of social ties (Elmer et al., 2017; Schaefer et al., 2011). The findings of an older study suggest that networks with a wider range of social ties (divers networks) are related to better well-being, as reflected, to varying degrees, in levels of loneliness, anxiety, and/or happiness. (Litwin, 2011). In this case, "diversity" in social networks is characterized by a higher percentage of married people in the network, more children and close family members, and the most frequent neighbor get-togethers and attendance at religious services. Individuals who are embedded into diverse social networks are less likely to report a high level of depressive symptoms (Litwin, 2011). In line with this, it has been shown that Chinese adults who had strong ties, a medium level of contact, and a high level of emotional closeness with three to five members of their social network, were less likely to experience depression than their counterparts who experienced lower levels of emotional closeness and social contact (Li et al., 2021).

Studies examining the link between social network size and incidence of depression have shown that having larger social networks (Santini et al., 2015), more inner circle relationships (Shouse et al., 2013), and trusted and frequent social connections with family and friends (Choi et al., 2020b), are all protective against depression. In line with it, a four-year longitudinal study found that belonging to more social groups was protective against the development of depression among an initially non-depressed sample and even curative of depression symptoms among an initially depressed sample (Cruwys et al., 2013). Greater social cohesion has also been linked to a reduced risk of incident depression, even in individuals with a high genetic or environmental risk for depression (Choi et al., 2020a).

Having more friends primarily protects against depressive symptoms by helping an individual experience a sense of belonging, indicating that social integration promotes mental health by inducing positive feelings about one's relationships with others (Ueno, 2005). Indeed, gregarious and diverse social networks contain the widest range and scope of relationships and therefore provide individuals with abundant social support reducing the severity of depressive symptoms ((Bai et al., 2020; Bassett and Moore, 2013; Cohen-Cline et al., 2018; Litwin, 2011), for a review, see Visentini et al., (2018)). In contrast, restricted social networks can create gaps in perceived social support, which negatively impacts mental health and life satisfaction (Harasemiw et al., 2019) and can lead to depression (Djernes, 2006).

Although depressed individuals spend less time in groups and marginally less time with friends, they do not necessarily spend less time with others overall (Baddeley et al., 2013). This finding has been supported by evidence from a recent study that used Radio Frequency Identification Devices, rather than self-reports of social interactions, to collect data on face-to-face interactions in individuals with depressive symptoms (Elmer and Stadtfeld, 2020). The study showed that individuals with higher levels of depressive symptoms spend less time in social interactions and more time with similarly depressed peers. They also spend more time in pairwise interactions instead of group interactions, but overall, they do not spend less time with friends (Elmer and Stadtfeld, 2020). Unfortunately, the tendency for depressed individuals to interact with other depressed people might increase their exposure to dysfunctional attitudes and thus provide a social influence for developing more depressive symptoms (van Zalk et al., 2010).

5.4. Diminished quality of social relationships

In recent years, the literature has increasingly recognized the importance of people's social relationships for preventing the development of affective disorders (Ge et al., 2017; Tough et al., 2017). For example, lower-quality relationships have been linked to more pronounced depressive symptoms (Thomas et al., 2019), and individuals diagnosed with depression often report having lower-quality social connections and lower levels of perceived social support than their non-anxious, non-depressed counterparts (Olatunji et al., 2007; Saris et al., 2017). In a cross-sectional study of Swiss patients, Barger et al. (2014) found that the perception of having unmet emotional support had the largest and most consistent associations with depression outcomes.

Although the connection between depressive symptoms and relationship quality or satisfaction seems to be bidirectional, depressive symptoms tend to be a stronger and more consistent predictor of lower relationship satisfaction (Morgan et al., 2018). Studies have shown that initial depression can reduce relationship quality (Oppenheimer and Hankin, 2011) and satisfaction (Meyer et al., 2019). Furthermore, depressive symptoms prospectively predict decreases in marital satisfaction (Kronmüller et al., 2011) and relationship quality with peers over a 10-year period (Oppenheimer and Hankin, 2011). Factors that moderate the association between depression and low marital satisfaction include deficits in problem-solving skills, reassurance-seeking behavior, using a smartphone and ignoring the partner during social interaction, and low social support (Amiri et al., 2012; Heene et al., 2007; Stewart and Harkness, 2015; Wang et al., 2017). These social behaviors, which are characteristic of depression, interfere with adaptive interpersonal functioning and thus lead to decreases in relationship quality over time (Rudolph, 2008). On the other hand, there are examples where poor relationship quality can lead to the development of depressive symptoms. For example, maternal depression has been linked to lower-quality relationships between the mother and the father (Akincigil et al., 2010).

5.5. Decreased feeling of social connectedness

Social connectedness is defined as the experience of interpersonal closeness with friends, family, strangers, acquaintances, peers, the community, and society in general. People develop a feeling of social connectedness through engagement in a wide range of social relationships, like meeting up with friends or family or attending social functions (Cohen, 2004). In adolescents, lower levels of social connectedness predict higher levels of depression and anxiety (Armstrong and Oomen-Early, 2009; Malaquias et al., 2015). Important factors that contribute to social connectedness include maintaining friendships, developing new relationships, and participating in group activities (Lee and Robbins, 2000). In general, people with high social connectedness tend to feel close to others, identify with them, perceive them as friendly, and participate more frequently (Lee et al., 2001).

Social connectedness is positively linked to subjective happiness and is therefore negatively correlated with loneliness and depressive symptoms (Satici et al., 2016). In contrast, people with low social connectedness have lower levels of interpersonal trust and therefore tend to

avoid or withdraw from the social opportunities that could otherwise enhance their weak sense of connectedness. In a survey-based study of school-aged adolescents in Abu-Dhabi with self-perceived depression, Badri et al. (2021) found that social connections and relationships with family and friends were found to directly affect the severity of participants' self-perceived depressive feelings. Specifically, survey response variables that addressed social connectedness, such as "feeling isolated from people," "the amount of quality time spent with family," "the frequency of meeting with friends, relatives or colleagues," and "involvement in informal activities with friends" had the strongest relationships with feelings of depression. Overall, Badri et al. (2021) confirmed that adolescents' depressive symptoms could be caused by a combination of direct and indirect factors related to family connections and relationships, formal and informal connections with friends, activities with community groups, feelings of isolation, physical health, and the general propensity to trust others. In addition, they demonstrated that the factors that contribute to feelings of isolation and loneliness among adolescents include involvement in informal activities with friends, and quality of time with family. Interestingly, social connectedness with friends influences depressive symptoms more than social connectedness with relatives, suggesting that friendship may be more important than family for preventing or alleviating depressive symptoms (Ge et al., 2017).

5.6. Increased loneliness

Individuals who are less socially integrated and/or lack a confidant typically exhibit more severe depressive symptoms (Barger et al., 2014), and social disconnectedness is tightly linked to perceived social isolation or feeling of loneliness (Santini et al., 2020). Loneliness is related to the subjective feeling of distress that arises when social connections are perceived to be inadequate or unfulfilling (Coyle et al., 2015; Tomaka et al., 2006). In a cross-sectional study on this theme, Meltzer et al. (2013) showed that people with depression are ten times more likely to feel lonely than the general population. Furthermore, loneliness is a strong risk factor for depression and a longitudinal predictor of depressive symptomatology (Cacioppo et al., 2010, 2006). However, longitudinal studies have demonstrated not only that loneliness increases the risk of developing (Sjöberg et al., 2013; Stessman et al., 2014) or worsening (Wang et al., 2018) depression, but also that loneliness and depression reciprocally influence each other (Cacioppo et al., 2006). In other words, people who are lonely are more likely to be become depressed, and their depression subsequently reinforces their loneliness. Despite this reciprocal relationship, a study using an emotion processing task showed that loneliness and depression have different effects on people's ability to recognize or process emotional facial expressions (Cheeta et al., 2021). Specifically, loneliness was associated with an increased accuracy for identifying sad faces and decreased accuracy for identifying fearful faces, whereas depression was associated with decreased accuracy in identifying happy faces.

In addition to debilitating nature of the depressive symptomatology, Achterbergh et al. (2020) has identified non-disclosure of depression as one of the main factors perpetuating a vicious cycle of loneliness and depressive symptoms. Non-disclosure is possibly routed in the fear of being judged and rejected and stems from stigmatizing attitudes towards people with mental health problems and a preference to avoid them (Jorm and Wright, 2008). Further, loneliness generates negative social cognitions and fear of negative evaluation, so that social contact is put on hold, creating a self-reinforcing loneliness cycle (Hawkley and Cacioppo, 2010).

Loneliness can predict depression more effectively than objective measures of social connection, like the number of social contacts (Cacioppo et al., 2010; Cornwell and Waite, 2009; Nguyen et al., 2020; Taylor et al., 2018). In contrast to objective social isolation which encompasses the tangible aspects of isolation, including physical separation from and little or no interaction with other people (de Jong-Gierveld, J. et al., 2006), feelings of loneliness refers to subjective social isolation, which represents someone's personal perception that they have fewer social relationships than desired or that they have not achieved a desired level of intimacy with others (de Jong-Gierveld, 1987). The distinction between loneliness and objective social isolation is important, as socially isolated young adults do not necessarily feel lonely, and young adults who feel lonely are not necessarily more socially isolated than their peers (Matthews et al., 2016). Thus, many school students can experience high levels of social contact but still feel lonely (Richardson et al., 2017).

6. Summary and conclusion

In our investigation of the social cost of depression, we thoroughly examine the impact of impaired social emotion regulation, social cognition, and interpersonal behavior on social functioning. By comprehensively evaluating affective and behavioral indicators, we reveal the pervasive influence of depression on various aspects of social capabilities.

Depression significantly disrupts self-focused social cognition, leading to social anhedonia, dysfunctional emotion regulation, low self-acceptance, limited self-compassion, and social-cognitive inflexibility. Moreover, deficits in other-focused social cognition emerge, including impaired emotion recognition, diminished empathy and mentalizing ability, heightened sensitivity to social rejection, and a negative social attribution bias.

Individuals with depression also exhibit reduced trust, forgiveness, and an inclination towards social comparison. Altered perceptions of self and others contribute to difficulties in anger management, social decision-making, social anhedonia, reassurance-seeking behavior, social avoidance, and problematic social media use as coping mechanisms. These factors generate increased interpersonal stress, limited social support, and lower-quality relationships, reinforcing the detrimental cycle of social withdrawal and depressed mood.

Our findings highlight the importance of addressing the comprehensive impact of depression on social adaptation and functioning, beyond core depressive symptoms. We advocate for integrating an assessment of social functioning and social networks in screening, treatment, and therapeutic approaches. Furthermore, we emphasize the need to prioritize psychological interventions targeting social cognitive deficits as primary clinical outcomes in order to effectively address the intricate interplay between depression and social isolation.

We assert that a thorough understanding of the social deficits experienced by individuals with depression and their consequences for quality of life, coupled with advancements in personalized medicine, will pave the way for future interventions that specifically target the intricate relationship between depression and social isolation. By mitigating the social cost of depression, we can empower individuals to sustain social connections and access vital resources necessary for managing their condition effectively.

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Author statement

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