Impaired social skills as a key component of clinical depression: associations with severity of illness, self-esteem, family functional health satisfaction, and personality features.

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Abstract

Background: Social skills deficits are present in 43.3% of major depressed patients and significantly impact health-related quality of life. However, studies concerning social deficits as state-dependent markers of depression are limited.

Objective: To delineate the effects of severity of depression, personality characteristics, family support satisfaction and self-esteem on social skills in clinical depression.

Methods: We recruited 150 patients with major depressive disorder or persistent depressive disorder and assessed 1) Beck Depression Inventory-II (BDI-II), 2) Social Skill Inventory (SSI), 3) Family Adaptation, Partnership, Growth, Affection, Resolve (APGAR) Questionnaire 4) Rosenberg Self-Esteem Scale (RSES) and 5) Maudsley Personal Inventory (MPI).

Results: Social skills deficits were significantly associated with female gender, age < 40 years, depression severity, introvert / neurotic personality, and lowered family support satisfaction and self-esteem. A large part of the variance (47.2%) in social skills deficits was predicted by satisfaction of family support, introvert personality, and low self-esteem. Exploratory Factor Analysis showed that a bifactorial model best fitted the data with a) a general factor loading highly on BDI-II, SSI emotional and social, APGAR, RSES, MPI_introvert and MPI_neurotic scores, and b) a single-group factor loading on both SSI, RSES, and MPI introvert scores.

Conclusion: In clinical depression, social skills deficits covary with increasing severity of depression and thus constitute a state marker of depression, and independently from severity of depression covary with introvert personality features. As such, remission of social skills deficits may emerge as a novel objective for the treatment of depression and prevention of new episodes.

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Introduction

Depression is a common psychiatric disorder with a lifetime prevalence between 5-17 per cent.[1] According to a World Health Organization study, depression was the world's third leading cause of disabilities[2] and will likely rank second after ischemic heart disease in 2020 while becoming the number one cause in 2030.[3] Depression is a biological disorder that may be triggered by psychosocial factors and as such depression treatment comprises a variety of treatment approaches including antidepressants, electroconvulsive therapy (ECT), cognitive and behavioral therapy (CBT), interpersonal psychotherapy (IPT) and other different forms of psychotherapy.[4]

Social skills deficiencies are associated with depression[5] and may present in 43.3% of patients with major depressive disorder.[6] Moreover, people who experienced severe life stress and lack good relationships or social skills may be at risk of depression.[7-9] while social skills deficiencies may impact patient's health-related quality of life (HR-QoL), and family, academic, work and social responsibilities.[10] Depressed patients often lack social skills and adequate social support due to low self-esteem, feelings of helplessness and worthlessness.[11, 12] Depressed patients may have difficulties in social situations due to fear of rejection and criticism from others, and, therefore, they may have difficulties expressing feelings towards other people.[4] The social skills deficits usually result in the lack of motivation to build relationships, decreased interest in social activities, emotional responses, and feeling of enjoyment (anhedonia).[13]

Other characteristics of social skill deficits in patients with depressive disorder are negatively recognizing and interpreting facial expressions, gestures, and emotions of others, lacking awareness and understanding of other people's emotions and lack of social support.[13] It

has been proposed that the high prevalence of social deficits in depressed patients may be explained by a cascade of factors. Thus, depressed patients show low self-esteem and increased rejection anxiety which may result in lowered socialization, less rewarding relationships and social support and that this could explain that patients become more introvert with social skills deficits.[12, 14] However, the associations between social skills deficits and severity of depression, introvert and neurotic personality, social support satisfaction and self-esteem have not been delineated in clinical depression.

Therefore, the purpose of this study was to delineate the effects of severity of depression, personality characteristics, family support, and self-esteem on social skills deficits in patients with clinical depression. The specific hypothesis is that the severity of depression and introvert personality will negatively affect social skills.

Materials and Methods

Participants

This study recruited one hundred and fifty outpatients, Thai nationals, aged 18 years or more who were diagnosed with major depressive disorder (MDD) or persistent depressive disorder (PDD or dysthymia) based on the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5). Exclusion criteria for patients were schizoaffective disorder, schizophrenia and other psychotic disorders, bipolar disorder, major neurocognitive disorders, organic psychosis, or substance use disorders. Patients were admitted to the Psychiatric Outpatient Department, King Chulalongkorn Memorial Hospital, Thailand from August 2019 to December 2019.

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All participants completed five questionnaires: 1) Beck Depression Inventory-II (BDI-II) - Thai version, 2) Social Skill Inventory (SSI) - Thai version, 3) Family Adaptation, Partnership, Growth, Affection, Resolve (APGAR) Questionnaire, 4) Revised Version of Thai Rosenberg Self-Esteem Scale (Revised Thai RSES), and 5) Maudsley Personal Inventory (MPI). The study was approved by the Ethics Committee (full board), the Institutional Review Board of Faculty of Medicine, Chulalongkorn University from 20 June 2019 (COA No. 679/2019, IRB no. 291/62).

Measures

Socio-Demographic and medical interviews included items assessing age, gender, marital status, education, occupation, income, physical illnesses, other psychiatric illnesses, and substance use. A medical data record form was completed by the researchers and included items assessing depression diagnosis, duration of illness with depression, the record of treatment for depression, including current medications, psychiatric admission and ECT. The diagnosis of major depression or dysthymia was made by a psychiatrist using the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5).

Beck Depression Inventory-II (BDI-II) was developed by Aaron T Beck, Gregory K Brown and Robert A Steer [15] and was translated and validated for use in the Thai population by Nantika Thavichachart, *et al*.[16] The BDI-II consists of 21 items to assess the severity of depression in depressed patients. The BDI-II is positively correlated with the Hamilton Depression Rating Scale (HDRS) with a Pearson's of 0.71, showing good agreement. The scores range from 0 to 63 and cut off into 4 levels (0-13 = no or mild depression, 14-19 = minimal depression, and 20-28 =

moderate depression, 29-63 = severe depression). The test also has high internal consistency (Cronbach α =0.91).[17]

Social Skills Inventory (SSI) **- Thai version** is a 66-item instrument developed by Darawan Klomkliang[18] from the original version of Ronald E. Riggio.[19] It is a comprehensive, self-report measure of six social/communication skills, reflecting both nonverbal and verbal sending ability, receiving or decoding ability, and control or regulation of communication. The six social/communication skills are; 1 Emotional Expressivity (EE), skills in sending/encoding nonverbal and emotional messages and the nonverbal expression of attitudes, dominance, and interpersonal orientation, 2 Emotional Sensitivity (ES), skills in receiving and interpreting the nonverbal messages as well as attentiveness to nonverbal cues, 3 Emotional Control (EC), the ability to regulate emotional and nonverbal displays of behavior, 4 Social Expressivity (SE), skills in verbal expression and the ability to engage others in social interaction, 5 Social Sensitivity (SS) is the ability to accurately decode/interpret others' verbal communications, as well as knowledge of and sensitivity to norms governing appropriate social behavior, and 6 Social Control (SC), skills in social role-playing and social self-presentation. We computed two subscores, namely SSI_E (emotional): as sum of EE + ES + EC, and SSI_S (social): sum of SE + SS + SC. The total score ranges from 0 to 132 and cut off score into 5 levels may be used with 0-58 = very low social skills, 59-71 = low social skills, and 72-86 = moderate social skills, 87-100 = high social skills, 101-132 = very high social skills. Scores between 0-71 indicate social skills deficits while scores between 72-132 indicate no social skills deficits. The scale has adequate internal consistency reliability (Cronbach α =0.88) and a good internal consistency of the six social/communication skills subscores (Cronbach α =0.71 - 0.82).

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The Family Adaptation, Partnership, Growth, Affection, Resolve (APGAR) Questionnaire, was developed in 1978 by Gabriel Smilkstein *et al.*[20] as a screening instrument for a family function. The questionnaire was translated into Thai and developed by Porntip Malathum.[21] The scores range from 0 to 20 and cut off into 3 levels of satisfaction (0-6 = low satisfaction with family function, 7-13 = moderate satisfaction with family function and 14-20 = high satisfaction with family function). The questionnaire also has high internal consistency (Cronbach α = 0.91).[22]

The Rosenberg Self-Esteem Scale (RSES), developed by Morris Rosenberg,[23] was used for measuring the person's self-esteem. This rating scale was translated in Thai by Thapanee Thangjitpukdeesakul and revised by Tinnakorn Wongpakaran in 2011.[24] The scale comprises ten items; six of the items have positively worded statements and the other four are negatively worded. Total scores range from 10 to 40, with higher scores indicating higher self-esteem. The scale also has high internal consistency (Cronbach α =0.86).

Maudsley Personal Inventory (MPI) was developed by Hans J. Eysenck and Robert R. Knapp.[25]This inventory is used extensively for measuring personalities. It was translated in Thai and adapted by Somsong Suwannalert *et al.*[26] It is a 48-item instrument to measure two dimensions of personality tendencies, 24-item for E-Extraversion (extravert and introvert) and 24-item for N-Neuroticism (neurotic and stable). Six of the items have negatively worded statements and the remaining are positively worded statements. Total scores range from 0 to 48 and based on the scores participants may be classified into 4 types of personality as extravert-

neurotic (scale E $\geq$ 24 and scale N $\geq$ 24), extravert- stable (scale E $\geq$ 24 and scale N < 24), introvert- neurotic (scale E < 24 and scale N $\geq$ 24) and introvert- stable (scale E < 24 and scale N < 24). The scale also has high internal consistency (Scale E Cronbach α = 0.91, Scale N Cronbach α = 0.90).

Statistical analysis

Differences in demographic data, severity of depression, duration of illness, BDI-II, APGAR, RSES and MPI scores between patients with lowered social skills and those with better skills (dichotomized using a 71 SSI threshold value) were analyzed by chi-square test or Fisher's Exact test and analysis of variance. To delineate the potential predictors of social skills deficits in depressed patients we used automatic multiple regression analysis and entered the relevant factors as defined by previous knowledge. We also performed binary logistic regression analysis to assess the relevant predictors of the group of patients with social deficits (dependent variable) and computed the odds ratio (OR) with 95% confidence interval (CI). Multiple testing was checked for false discovery rate (FDR) using the Benjamini-Hochberg procedure.[27] A p-value of less than 0.05 was considered to be statistically significant. Internal consistency reliability of the rating scales was checked using Cronbach's alpha coefficient. Statistical analyses were performed using SPSS software for Windows 25.0 (SPSS Inc., Chicago, IL).

We used exploratory factor analysis (EFA) to examine the factor structure of the BDI-II, SSI_E, SSI_S, APGAR, RSES, MPI_Introvert and MPI_neurotic scores in the 150 clinically depressed patients. Different models were tested, i.e. one and two-factor models, a pure Exploratory Bifactor Model with Promin rotation and Schmid-Leiman orthogonalization using FACTOR, windows version 10.5.03[28, 29] We used a robust unweighted least squares method

with bias-corrected and accelerated (BCa) bootstraps (500 samples). The factorization adequacy was checked using the Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity. The distribution of residuals was checked employing the weighted root mean square of residuals (RMSR) with Kelley's criterion (the RMSR for an acceptable model) and weighted root mean square residual (WRMR). The root mean squared error of approximation (RMSEA) was used to check the Goodness-of-fit levels. The quality of the factor scores was estimated using the factor determinacy index (FDI) (values >0.80 indicates good quality), ORION marginal reliability (> 0.80), expected percentage of true differences (> 90%) and the sensitivity ratio (> 2). Construct replicability or stability across studies was assessed using the H index with values ≥ 0.80 indicating good replicability.

Results

Descriptive data

The mean (±SD) age of the 150 patients was 32.1 (±13.0) years 30 males and 120 females were included. The BDI-II (Cronbach α =0.94), SSI (Cronbach α =0.94), and APGAR (Cronbach α = 0.92) scales showed excellent internal consistency reliability while that of the RSES was adequate (Cronbach α = 0.78). The internal consistency reliability of the MPI scale was adequate with a Cronbach α coefficient of 0.71 for Scale E and 0.90 for Scale N.

The mean (±SD) total social skills score was 78.06±16.47. We found that most depressed patients have low social skills scores (36.0%), followed by high levels (22.0%), moderate (18.0 %), very high (13.3 %), and very low (10.7 %) levels. The mean (±SD) score of the BDI-II was 26.57±14.35. We found that most depressed patients had severe depression (38.7%), followed by moderate (24.7 %), minimal (20.0 %), and no to mild (16.7 %) depression. The mean (±SD)

APGAR score was 12.73±5.34 and divided into 3 levels, most depressed patients show high satisfaction (48.0%), followed by moderate (39.3 %), and low (12.7 %) satisfaction. The mean (±SD) RSES score was 23.95±6.06. The prevalence of low self-esteem in depressed patients was 60.0%. Based on E-Extraversion scores, we found that 37.3% of the patients were extravert and 62.7% introvert and based on the N-Neuroticism scores, 82.7% of our patients were neurotic and 17.3% stable. Classified into 4 types of personality we found the following distribution: extravert- stable (scale E ≥ 24 and scale N < 24, 9.3%), extravert- neurotic (scale E ≥ 24 and scale N ≥ 24, 27.3%), introvert- stable (scale E < 24 and scale N < 24, 8.7%) and introvert-neurotic (scale E < 24 and scale N ≥ 24, 54.7%).

Differences between patients with and without lower SSI scores

When using a 71-cutoff value for the SSI score, we found that 46.7% of the patients had lowered social skills. **Table 1** shows the socio-demographic data of 150 depressed patients divided into those with lowered social skills (SSI score < 71) versus those with better social skills (SSI score ≥ 71). There were no significant differences in age, marital status, education, occupation, income, financial adequacy, physical illness, other psychiatry illness, substance use, previous ECT treatments between both SSI groups. Duration of depression was somewhat greater in patients with better social skills than in those with lowered skills. The APGAR, RSES and MPI Scale E scores were significantly higher in those with better social skills than in patients with lowered social skills while the sum of BDI-II and MPI_N score were significantly higher in those with lowered social skills than in patients with better social skills. **Table 2** shows the mean values of the social skills domains of the 150 depressed patients dichotomized using a 71 cut-off

value. All social skills domain sub-scores were significantly lower in patients with social skills deficits, except the Social Sensitivity score.

Correlation matrix

Pearson's correlations showed significant associations between the SSI score and BDI-II (r=-0.346), APGAR (r=0.333), RSES (r=0.554), MPI_E (r=0.535) and MPI_N (r=-0.492) scores (all p<0.001, n=150). In addition, the BDI-II score was significantly associated with APGAR (r=-0.300), RSES (r=-0.693), MPI_E (r=-0.247) and MPI_N (r=0.527) scores (all p<0.001, except MPI_E: p=0.002, n=150).

Prediction of lowered SSI scores

Table 3 shows the results of binary logistic regression analysis with the group of patients with lowered SSI scores as dependent variable. We found that MPI_E and RSES scores best predicted the group of patients with lowered SSI values ($\chi2$=63.89, df=2, p<0.001, Nagelkerke=0.463).

Table 4 shows the results of multiple regression analysis with the SSI score as dependent variable. We found that 47.2% of the variance in the social skills deficits score was explained by the regression on RSES, MPI_E, and APGAR scores. **Figure 1** shows the partial regression of the total SSI score on the MPI_E score. **Figure 2** shows the partial regression of the SSI score on the RSES score. Forced entry of the BDI-II showed no significant effects of this depression score on the SSI (t=0.78, p=0.44) while all the above-mentioned predictors remained significant. Age, gender, education, previous ECT, physical illness, other psychiatric disorders, use of alcohol and smoking were not significant in this regression analysis. We found that 34.0% of the variance in

the SSI_E sub-score was predicted by RSES, MPI_E and APGAR scores, whereas 40.0% of the variance in the SSI_S score was predicted by MPI_E and RSES scores.

Results of exploratory factor analysis

Table 5 shows the results of exploratory factor analysis which was carried out on the 150 cases and performed on the BDI-II, SSI_E, SSI_S, APGAR, RSES, MPI_Introvert and MPI_Neurotic scores. The KMO value (0.79007) and Bartlett's test (χ^2=395.4, df=21, p<0.00001) showed that the sampling adequacy and factorability of the correlation matrix were satisfactory. We found that a bifactorial model most appropriately modelled the data (based on RMRS and RMSEA values). Table 5 shows that all items scored highly on the general factor and SSI_E, SSI_S, MPI_Introvert and RSES on the single-group factor. Table 5 shows that the model fit was more than acceptable (RMRS and RMSEA values). Moreover, the H-indices (construct replicability) of the first and second order factor were adequate. The effectiveness of the general and single-group factors was more than adequate as indicated by the Factor Determinacy index, ORION marginal reliability, expected percentage of true differences and the sensitivity ratio. These data show that a bifactorial solution fits the data adequately and that the general factor is well delineated by all domains and the single-group factor by social skills deficits, introvert personality and self-esteem.

Discussion

In this study, 46.7 per cent of depressed patients had social skills deficits. The prevalence of social skills deficits in this study was similar to the study from the US National Comorbidity Survey Replication (NCS-R) which reported that 43.3% of depressed patients showed social role

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impairments. Depressed patients with social deficits showed significantly lower scores on both the emotional and social subscores and lower scores on all items, except social sensitivity, which was not significant different between patients with and without a lower total SSI score. Previously, it was reported that patients with depression and mood disorders show lower social skills both in emotional and social domains as compared with normal controls, although emotional sensitivity and social sensitivity may be higher in patients than controls.[30] Previous studies frequently reported higher emotional sensitivity in patients with major depressive disorders.[31] It was proposed that the higher social sensitivity in depression may result from fear of disappointment, abandonment, rejection, scornfulness[32, 33] and, especially, social rejection.[34] Paykel *et al.* reported that depressed patients show impairments in 6 subdomains of social skills or social adjustment, namely work performance, interpersonal friction, inhibited communication, submissive dependency, family attachments, and anxious ruminations.[35]

We found that lowered social skills in depressed patients are significantly associated with female gender, severity of depression, family support satisfaction, low self-esteem, and introvert and neurotic personality, while there was a trend toward patients with lower age in participants with social deficits. Previously, it was detected that individuals of 40-60 years old have higher maturity levels with better coping or problem-solving patterns, and better social skills.[36, 37] Women tend to be more sensitive, express more emotions, anxiety or worries than men, while men can more effectively control and manage their emotions, explaining the gender-related differences.[38] Moreover, women show higher emotionality and good social skills in interpersonal relations.[38] The association between severity of depression and deficiencies in social skills extend the findings of Wai et al.[39] who reported that depression has a negative impact on social skills, especially those related to social behaviors. Our findings that lowered

family support satisfaction is associated with social skills deficits in depression extend the findings[4, 40] reporting that good family support, especially emotional support, may improve the skills needed to cope with stressors including negative life events.

Our findings that low self-esteem is associated with social skills deficiencies extend those of a previous report[41] that self-esteem scores were positively correlated with almost all social skills except social sensitivity, which was inversely associated with self-esteem. The latter may contribute to social skills deficits because lack of confidence in a social context may be associated with social isolation.[41] The association between introvert/neurotic personality scores and social skills deficits may be explained by a number of factors. First, individuals with internal orientation most often enjoy limited relationships and do not seek social engagements.[42] Second, neurotic people are more likely to experience feelings of anxiety, loneliness, depressed mood, fear, frustration, anger, jealousy and guilt [43] and, therefore, may respond less adequately to stressors and interpret ordinary situations as threatening and as such, they are at increased risk of mood disorders.[44] Third, both types of personalities are characterized by impairments in the development of adequate skills, especially social skills.[45]

We found that a large part of the variance (around 40%) in social skills deficits could be explained by the combined effects of low self-esteem and satisfaction with family support, and introvert personality. As such, our findings (at first sight) may corroborate the psychodynamic hypothesis formulated in the introduction that depressed patients show low self-esteem which leads to communication impairments and less rewarding relationships and social support thereby explaining they may become more introvert and display social skills deficits.[12, 14] Nevertheless, many symptomatic features of depression have immediate effects on skilled social behaviors and personality characteristics as for example psychomotor retardation symptoms which comprise

delayed motor behaviors with slowed speech, long response latencies, diminished eye contact, and increased nervous gesturing.[46, 47] In fact, such symptoms may be considered to indicate poor social skills. Another symptomatic feature of depression, namely feelings of worthlessness, may lead to avoidance of social engagements and social withdrawal thereby disrupting social behaviors[48] and malfunctional responses to stressors for example by interpreting common situations as being threatening and desperately difficult,[44] suggesting some characteristics of personality disorders.

Nevertheless, the associations between social skills deficits and depression most probably reflect reciprocal relationships whereby depression may cause social deficits, and poor social skills may cause depression or constitute a vulnerability factor in the development of depression.[48] Based on these reciprocal relationships between both factors, we have performed an exploratory factor analysis to detect the associations of social skills deficits and severity of depression, self-esteem, satisfaction with family support, and personality features, and whether those domains belong to a same factor. We found that those domains were most appropriately modeled employing a bidimensional oblique solution, which yielded a general factor with high loadings on all domains, and a single-group factor (SGF) which loaded on social skills deficits, introvert personality and self-esteem. The first general factor indicates that increasing severity of illness covaries with the other domains, and that when severity of illness increases also social skills deficits, self-esteem, satisfaction with family support, and introvert/neurotic personality become more apparent. As such, these different domains constitute phenomenological features of clinical depression that covary with severity of depression and, therefore, social skills deficits appear to be state markers of depressive episodes.[49] This is in agreement with previous studies which suggested that social skills deficits may be manifestations of state depressive factors.[39]

Previous studies showed that low self-esteem is associated with several negative outcomes including depression.[50] People with low self-esteem are more troubled by failure, negative attitudes and focus on avoiding making mistakes in life. For example, they are more likely to experience social anxiety and low levels of interpersonal confidence and often interpret noncritical comments as critical.[51] Moreover, they are mostly unhappy, unmotivated, withdrawal, dependent, socially inept, with poor self-image and communication skills.[52] Higher levels of family support give people with clinical depression more confidence thereby increasing effective coping strategies, social skills and personality features, and reducing subsequent depressive symptoms.[53] Because many depressed patients have low self-esteem and an introvert personality and are socially more isolated they cannot maintain rewarding and supportive relationships and lack good social support.[4] Without a healthy family attachment, individuals may be more vulnerable to stress and have difficulties coping with trauma, as well as anxiety, depression, and other mental illness.[54]

Our factor analysis also revealed a single-group factor indicating that there is a strong association between social skills deficits, introvert personality and lower self-esteem ad that this association may occur independently from severity of depression. As such, this single-group factor may be interpreted as a trait factor which is a characteristic of patients with clinical depression and, consequently, it is tempting to speculate that interpersonal and psycho-social deficits may play a role in the onset of depression. Those findings extend Lewinsohn's social skills deficit model of depression[55] suggesting that social skills deficits may increase vulnerability to develop depression[48] or that social skills (assertiveness and problem-solving behaviors) independently of depression may predict future depression.[56]

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Some limitations of this study need further consideration. First, the study was conducted on depressive patients recruited at the Psychiatric Department, King Chulalongkorn Memorial Hospital which may limit the generalizability of our findings. Second, we did not assess other personalities including cluster B personalities, which may affect the patients' social skills. Third, since this study followed a cross-sectional design, we cannot delineate causal relationships.

Conclusions

In summary, in clinical depression, social skills deficits covary with increasing severity of depression and thus constitute a state feature of depression. Moreover, independently from severity of illness, social skills deficits also covary with introvert personality features and, therefore, may constitute a trait feature of that illness. The findings indicate that lowered social skills emerge as new state/trait markers of depression and, therefore, constitute a new treatment target. This is important as social skills deficits are a symptom of severity of depression and may compromise the outcome of a depressive episode and may be associated with the onset of a depressive episode. As such, remission of social skills deficits may emerge as a novel objective for the treatment of the acute state of depression. Therefore, treatments of depression should not only focus on treatments with drugs and psychotherapies to reduce severity of depression, but also on social skills enhancing programs. Future research should examine the clinical efficacy of such treatments in reducing severity of the acute phase of depression as well as in preventing new episodes.

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Conflict of interest

The authors, hereby, declare no conflicts of interest.

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The authors contribute to this study. Patients were recruited by PK and statistics were performed by PK and MM.

References

1. Sadock BJ, Sadock VA. Kaplan and Sadock's synopsis of psychiatry: Behavioral sciences/clinical psychiatry.: Lippincott Williams & Wilkins; 2011.
2. World Health Organization. The global burden of disease: 2004 update. 2004.

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3. Murray CJ, Lopez AD, Organization WH. The global burden of disease: a comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020: summary: World Health Organization; 1996.

4. Lueboonthavatchai P, Lueboonthavatchai O. Psychosocial treatment for depressive disorder. 1st ed. Bangkok: Tanapress; 2010. 266 p.

5. Weissman MM, Markowitz JC, Klerman G. Comprehensive guide to interpersonal psychotherapy: Basic Books; 2008.

6. The National Comorbidity Survey Replication (NCS-R) in, Kupferberg A, Bicks L, Hasler G. Social functioning in major depressive disorder. Neuroscience & Biobehavioral Reviews. 2016;69:313-32.

7. Kohn Y, Zislin J, Agid O, Hanin B, Troudart T, Shapira B, et al. Increased prevalence of negative life events in subtypes of major depressive disorder. Comprehensive Psychiatry. 2001;42(1):57-63.

8. Roy A. a case–control study of social risk factors for depression in American patients. SAGE Publications Sage CA: Los Angeles, CA; 1997.

9. Lloyd C. Life events and depressive disorder reviewed: II. Events as precipitating factors. Archives of General Psychiatry. 1980;37(5):541-8.

10. Revicki DA, Kleinman L, Cella D. A history of health-related quality of life outcomes in psychiatry. Dialogues in Clinical Neuroscience 2014;16(2):127.

11. Mann MM, Hosman CM, Schaalma HP, De Vries NK. Self-esteem in a broad-spectrum approach for mental health promotion. Health Education Research. 2004;19(4):357-72.

12. "Depression, Poor Social Skills are Linked" [Internet]. University of Arizona. [cited 2020 Apr 28]. Available from: https://sbs.arizona.edu/news/depression-poor-social-skills-are-linked.

13. Kupferberg A, Bicks L, Hasler G. Social functioning in major depressive disorder. Neuroscience & Biobehavioral Reviews. 2016;69:313-32.

14. Fredric NB, Marie R, Theodore S. Psychodynamic treatment of depression first edtion. Arlington: American Psychiatric Publishing,Inc; 2004.

15. Beck AT, Steer RA, Brown GK. Beck depression inventory-II. San Antonio. 1996;78(2):490-8.

16. Thavichachart N, Tangwongchai S, Worakul P, Kanchanatawan B, Suppapitiporn S, na Pattalung AS, et al. Posttraumatic mental health establishment of the Tsunami survivors in Thailand. Clinical Practice & Epidemiology in Mental Health. 2009;5(1):11.

17. Beck AT, Steer RA, Ball R, Ranieri WF. Comparison of Beck Depression Inventories-IA and-II in psychiatric outpatients. Journal of Personality Assessment. 1996;67(3):588-97.

18. Klomkliang D. A construction of social skills tests for mathayom suksa I-III students [Master of Education]: Srinakharinwirot University. November; 2003.

19. Riggio RE CD. Social skills inventory manual. second ed. Redwood City, CA: Mind Garden; 2003.

20. Smilkstein G, Ashworth C, Montano D. Validity and reliability of the family APGAR as a test of family function. The Journal of Family Practice. 1982;15(2):303-11.

21. Malathum P, Acton G, Hanucharurnkul S, editors. A Predictive Model of Factors Contributing to Perceived Abilities for Health-Promoting Self-Care of Community-Dwelling Thai Older Adults. 37th Biennial Convention-Scientific Session; 2003.

22. Malathum P, Kongiem J, Intarasombat P. Relationships of family support and friend support to life satisfaction of older adults in rural areas. Ramathibodi Nursing Journal. 2010;15:431-8.

23. Rosenberg M. Society and the adolescent self-image: Princeton university press; 2015.

24. Tinakon W, Nahathai W. A comparison of reliability and construct validity between the original and revised versions of the Rosenberg Self-Esteem Scale. Psychiatry Investigation. 2012;9(1):54.

25. Eysenck H, Knapp R. Manual for the Maudsley Personality Inventory. San Diego: Educational and Industrial Testing Service. 1962.

26. Suwannalert S, et al. The Maudsley Personality Inventory Test in Secondary and University Students. J Psychiatr Assoc Thailand. 1969;14 (January-February) 17-29.

27. Benjamini Y, Hochberg Y. Controlling the false discovery rate: a practical and powerful approach to multiple testing. Journal of the Royal Statistical Society: Series B (Statistical Methodology). 1995;57(1):289-300.

28. Ferrando PJ, Lorenzo-Seva U. Program FACTOR at 10: Origins, development and future directions. Psicothema. 2017;29(2):236-40.

29. Lorenzo-Seva U, Ferrando PJ. A general approach for fitting pure exploratory bifactor models. Multivariate Behavioral Research. 2019;54(1):15-30.

30. Perez JE, Riggio RE, Kopelowicz A. Social skill imbalances in mood disorders and schizophrenia. Personality and Individual Differences. 2007;42(1):27-36.

31. Jacobson S. Why am I so oversensitive? UK: Harley therapy counselling; May 22, 2018 [Available from: https://www.harleytherapy.co.uk/counselling/why-am-i-so-oversensitive.htm.

32. Allen NB, Badcock PB. The social risk hypothesis of depressed mood: evolutionary, psychosocial, and neurobiological perspectives. Psychological Bulletin. 2003;129(6):887.

33. Girard JM, Cohn JF, Mahoor MH, Mavadati S, Rosenwald DP, editors. Social risk and depression: Evidence from manual and automatic facial expression analysis. 2013 10th IEEE International Conference and Workshops on Automatic Face and Gesture Recognition (FG); 2013: IEEE.

34. Slavich GM, O'Donovan A, Epel ES, Kemeny ME. Black sheep get the blues: A psychobiological model of social rejection and depression. Neuroscience & Biobehavioral Reviews. 2010;35(1):39-45.

35. Paykel ES, Weissman M, Prusoff BA, Tonks CM. Dimensions of social adjustment in depressed women. Journal of Nervous and Mental Disease. 1971;152(3):158-72.

36. Duangden D. The preparation for organization to Aging society. Productivity World Journal: Thailand Productivity Institute; 2015 August 17 [Available from: https://www.ftpi.or.th/2015/5093.

37. Luong G, Charles ST, Fingerman KL. Better with age: Social relationships across adulthood. Journal of Social and Personal Relationships. 2011;28(1):9-23.

38. Margalit M, Eysenck S. Prediction of coherence in adolescence: Gender differences in social skills, personality, and family climate. Journal of Research in Personality. 1990;24(4):510-21.

39. Wais T, Alyson J. The impact of depression on social skills. Journal of Nervous & Mental Disease. 2004;192(4):260-68.

40. Gavidia-Payne S, Stoneman Z. Family predictors of maternal and paternal involvement in programs for young children with disabilities. Child Development. 1997;68(4):701-17.

41. Riggio RE, Throckmorton B, Depaola S. Social skills and self-esteem. Personality and Individual Differences. 1990;11(8):799-804.

42. Janowsky DS. Introversion and extroversion: implications for depression and suicidality. Current Psychiatry Reports. 2001;3(6):444-50.

43. Thompson ER. Development and validation of an international English big-five mini-markers. Personality and Individual Differences. 2008;45(6):542-8.

44. Ormel J, Jeronimus BF, Kotov R, Riese H, Bos EH, Hankin B, et al. Neuroticism and common mental disorders: meaning and utility of a complex relationship. Clinical Psychology Review. 2013;33(5):686-97.

45. Saul M. Theories of personality. Simply Psychology 2017 [cited 2019 February 20]. Available from: https://www.simplypsychology.org/personality-theories.html.

46. Sobin C, Sackeim HA. Psychomotor symptoms of depression. American Journal of Psychiatry. 1997;154(1):4-17.

47. Williams JG, Barlow DH, Agras WS. Behavioral measurement of severe depression. Archives of General Psychiatry. 1972;27(3):330-3.

48. Segrin C. Social skills deficits associated with depression. Clinical Psychology Review. 2000;20(3):379-403.

49. Youngren MA, Lewinsohn PM. The functional relation between depression and problematic interpersonal behavior. Journal of Abnormal Psychology. 1980;89(3):333.

50. Silverstone PH, Salsali M. Low self-esteem and psychiatric patients: Part I–The relationship between low self-esteem and psychiatric diagnosis. Annals of General Psychiatry. 2003;2(1):2.

51. Rosenberg M, Owens TJ. Low self-esteem people: A collective portrait. 2001.

52. Guindon MH. Toward accountability in the use of the self-esteem construct. Journal of Counseling & Development. 2002;80(2):204-14.

53. Kamen C, Cosgrove V, McKellar J, Cronkite R, Moos R. Family support and depressive symptoms: a 23-year follow-up. Journal of Clinical Psychology. 2011;67(3):215-23.

54. Lander L, Howsare J, Byrne M. The impact of substance use disorders on families and children: from theory to practice. Social Work in Public Health. 2013;28(3-4):194-205.

55. Lewinsohn PM. A behavioral approach to depression. Essential Papers on Depression. 1974:150-72.

56. Wierzbicki M. Social skills deficits and subsequent depressed mood in students. Personality and Social Psychology Bulletin. 1984;10(4):605-10.

Table 1. Socio-demographic and clinical data in 150 depressed patients divided into those with and without social skill deficits based on the Social Skills Inventory scale.

Variables	Social skill deficits		F / χ^2	df	P
	Deficits (n = 70)	No deficits (n = 80)			
Age (years)	29.97(11.67)	33.93(13.88)	3.51	1/148	0.063
Gender male / female	8/62	22/58	6.03	1	0.014
Marital status married / single, widowed, divorced	18/52	27/53	1.15	1	0.284
Education secondary school and lower / bachelor's degree and higher	22/48	23/57	0.13	1	0.721
Occupation employed / unemployed	42/28	52/28	0.40	1	0.528
Income (baht per month)	13221.29 (14610.26)	17644.00 (19528.33)	2.41	1/148	0.123
Financial adequacy enough / not enough	51/19	64/16	1.07	1	0.302
Duration of depression (months)	34.33(37.16)	36.65(42.34)	0.13	1/148	0.723
ECT yes / no	6/64	2/78	2.73	1	0.147[a]
Physical illness presence / absence	31/39	44/36	1.71	1	0.190
Other psychiatric illness presence / absence	6/64	10/70	0.61	1	0.437
Substance use yes / no	26/44	37/43	1.27	1	0.260
BDI-II	31.87(13.27)	21.93(13.71)	20.25	1/148	<0.001
APGAR score	11.23(5.47)	14.05(4.88)	11.15	1/148	0.001
RSES score	20.73(4.13)	26.76(6.09)	48.99	1/148	<0.001
MPI_E	17.43(6.87)	23.91(5.94)	38.45	1/148	<0.001
MPI_N	37.76(6.64)	30.08(10.90)	26.24	1/148	<0.001

[a] = Fisher's Exact Test. Social skills deficits: defined by a 71 cut-off score on the Social Skills Inventory scale.

ECT = Electroconvulsive therapy, BDI-II = Beck depression inventory II, APGAR = The Family Adaptation, Partnership, Growth, Affection, Resolve Questionnaire, RSES = The Revised version of Thai Rosenberg Self-Esteem Scale, MPI = The Maudsley Personal Inventory

Table 2. Measurements of social skills subdomains in patients divided into those with and without social skill deficits based on the Social Skills Inventory scale.

Variables	Social skill deficits		F	df	P
	Deficits (n = 70)	No deficits (n = 80)			
Domains					
Emotional Expressivity (EE)	7.71(3.21)	11.55(2.67)	63.71	1/148	<0.001
Emotional Sensitivity (ES)	11.20(2.64)	13.75(3.05)	29.59	1/148	<0.001
Emotional Control (EC)	9.97(3.68)	14.78(4.34)	52.69	1/148	<0.001
Total SSI_E	28.89(4.43)	40.08(5.58)	181.44	1/148	<0.001
Social Expressivity (SE)	9.26(3.28)	17.40(3.79)	195.02	1/148	<0.001
Social Sensitivity (SS)	16.40(2.90)	17.31(3.86)	2.623	1/148	0.107
Social Control (SC)	8.70(3.33)	16.24(4.21)	144.98	1/148	<0.001
Total SSI_S	34.36(5.46)	50.95(6.78)	267.27	1/148	<0.001

Social skills deficits: defined by a 71 cut-off score on the Social Skills Inventory scale.

SSI_E: Social Skills Emotional subscore

SSI_S: Social Skills Social subscore

Table 3. Binary logistic regression with the group of depressed patients with social skills deficits as dependent variable and those with

no such deficits as reference group

Predictors of social skills deficits	B	SE	Wald	df	p	Adjusted Odds Ratio (OR)	95% CI Lower	95% CI Upper
RSES score	1.02	0.046	22.15	1	< 0.001	0.81	0.74	0.88
MPI Introvert personality	1.28	0.033	11.58	1	0.001	0.89	0.84	0.95

95% CI: 95% Confidence Interval.
RSES: The Revised version of Thai Rosenberg Self-Esteem Scale, MPI: The Maudsley Personal Inventory.

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Table 4. Results of multiple linear regression analyses with the Social Skills Inventory (SSI) total score or subdomain scores as dependent variables

Dependent variables	Explanatory variables	β	t	p	F_{model}	df	p	R^2
Total SSI score	**Model**				39.29	3/146	< 0.001	0.45
	APGAR score	0.37	5.34	< 0.001				
	MPI_E score	0.36	5.34	< 0.001				
	RSES score	0.15	2.37	0.019				
SSI_E sub-score	**Model**				24.88	3/146	<0.001	0.34
	RSES score	0.33	4.35	<0.001				
	MPI_E	0.28	3.84	<0.001				
	APGAR	0.17	2.35	0.020				
SSI_S sub-score	**Model**				48.36	2/147	<0.001	0.40
	MPI_E	0.38	5.43	<0.001				
	RSES score	0.38	5.41	<0.001				

SSI_E: Social Skills Emotional subscore, SSI_S: Social Skills Social subscore, APGAR: The Family Adaptation, Partnership, Growth, Affection, Resolve Questionnaire, MPI: The Maudsley Personal Inventory, RSES: The Revised version of Thai Rosenberg Self-Esteem Scale

Table 5. Results of Pure Exploratory Bifactor analysis, bias-corrected and accelerated (BCa) bootstrap with 95% confidence intervals

Sample	Patients with clinical depression	
Factors	**Single-Group Factor**	**General Factor**
BDI-II	-0.269 (-0.518 / -0.039)	**0.950** (0.887 / 1.012)
SSI_Emotional	**0.667** (0.544 / 0.755)	**0.466** (0.394 / 0.544)
SSI_Social	**0.754** (0.664 / 0.850)	**0.469** (0.408 / 0.533)
APGAR	0.256 (0.041 / 0.398)	**0.342** (0.124 / 0.472)
RSES	**0.316** (0.190 / 0.516)	**0.730** (0.592 / 0.848)
MPI_Introvert	**0.510** (0.348 / 0.626)	**0.342** (0.236 / 0.452)
MPI_Neurotic	0.042 (-0.372 / 0.286)	**0.582** (0.421 / 0.693)
Root mean Square Error (RMSEA)	0.00 (0.00-0.0787)	
Root Mean square of residuals	0.0167 (0.010-0.017)	
Weighted Root Mean Square Residual	0.0151 (0.010-0.015)	
ORION marginal reliability	0.869	0.973
Sensitivity ratio (SR)	2.578	5.985
Expected % of true differences (EPTD)	91.1%	97.1%
Factor Determinacy index	0.932	0.986
Generalized H index	0.868 (0.744-0.936)	0.975 (0.833-1.00)

BDI-II: Beck depression inventory II, SSI: Social Skills Inventory, APGAR: The Family Adaptation, Partnership, Growth, Affection, Resolve Questionnaire, RSES: The Revised version of Thai Rosenberg Self-Esteem Scale, MPI: The Maudsley Personal Inventory
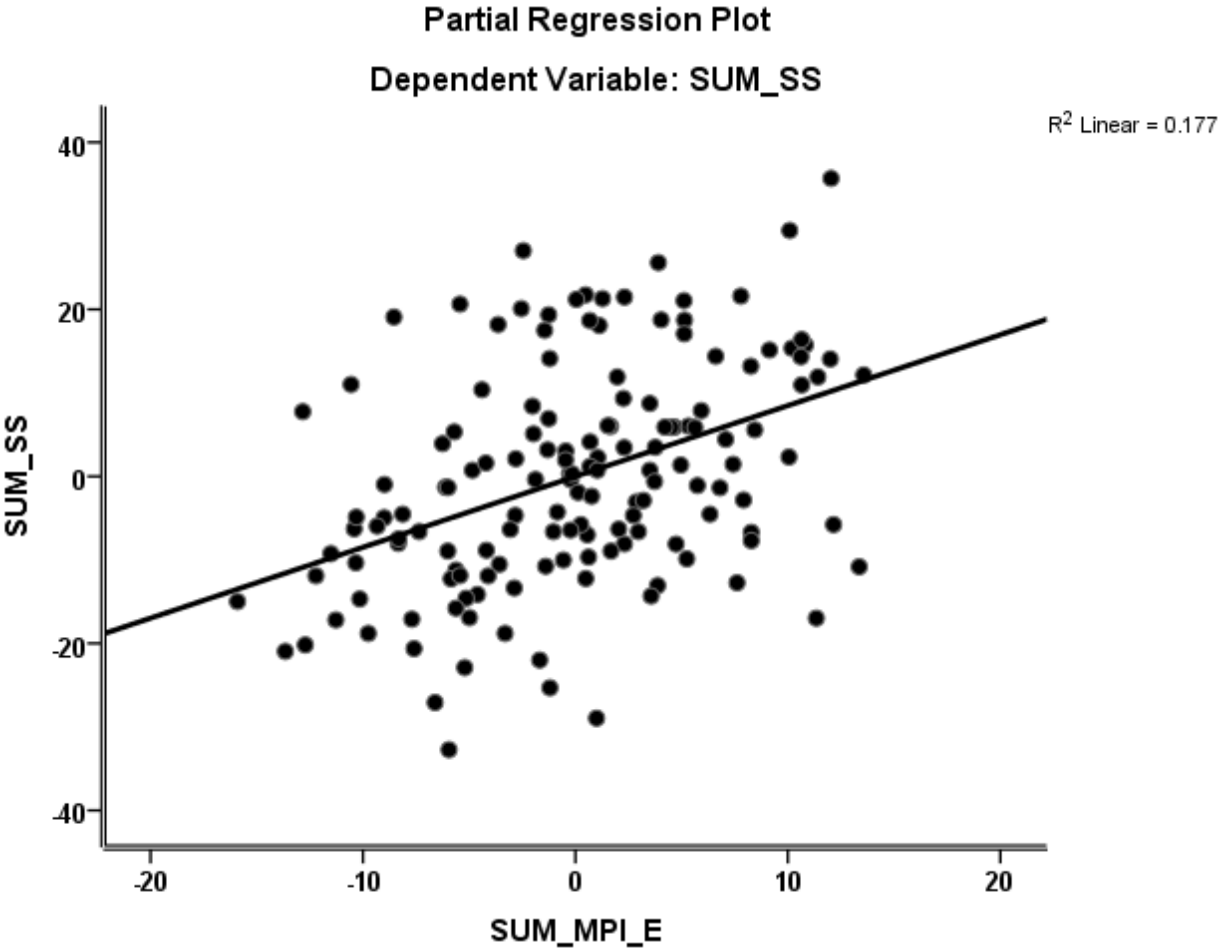
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Figure 1. Regression of total sum of the social skills score (Sum_SS) on E-Extraversion: extravert- introvert score (Sum_MPI_E)
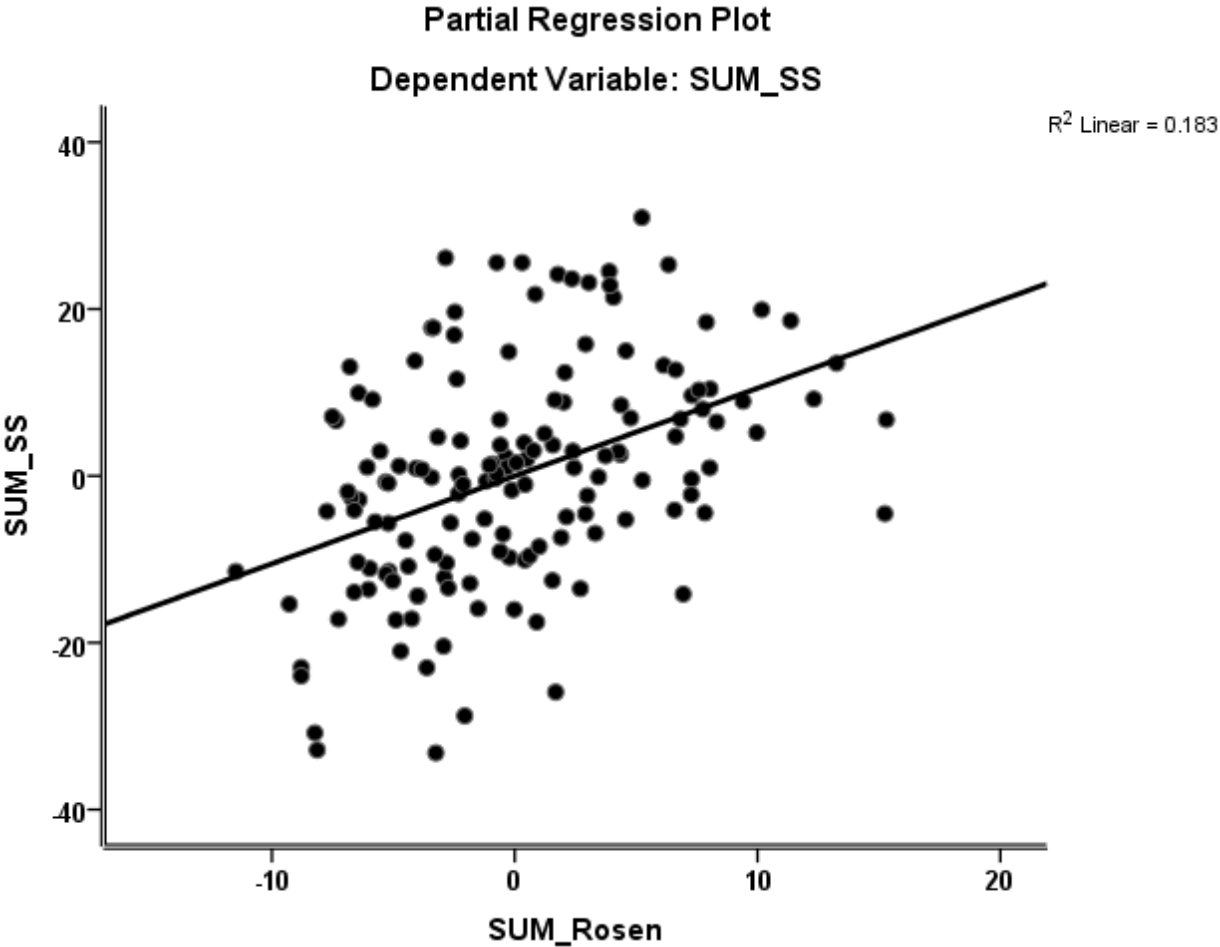
Figure 2. Regression of total sum of the social skills score (Sum_SS) on satification of family support score (Sum_Rosen)