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SPECIAL SECTION: QOL IN MENTAL DISORDERS

Self-stigma and suicide risk mediates the associations of inattention/impulsivity symptoms with psychological distress and quality of life among people with schizophrenia

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Abstract

Purpose The present study examined whether self-stigma mediated the associations from inattention/impulsivity symptoms and suicide risk to psychological distress and quality of life (QoL) among individuals with schizophrenia.

Methods A longitudinal study was conducted comprising 241 individuals with schizophrenia who were recruited from daycare and outpatient units in Southern Taiwan. Eligible participants were adults (≥20 years) diagnosed with schizophrenia and enrolled in a daycare program or receiving regular outpatient follow-up. After providing informed consent, participants were interviewed to assess self-stigma, inattention and impulsivity symptoms, suicide risk, psychological distress, and QoL. Individuals with a history of moderate to severe substance use disorder (except tobacco use disorder) or head injury were excluded.

Results Self-stigma mediated the relationships between inattention and impulsivity symptoms and both psychological distress and QoL among Taiwanese individuals with schizophrenia. More specifically, the indirect effect of inattention and

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impulsivity symptoms at Time 1 (T1) on each QoL domain (physical, psychological, social, and environment QoL at T3 through self-stigma at T2 was significant (β = −0.05 to −0.03, $p < 0.05$). The indirect effect on psychological distress at T3 was also significant (β = 0.06, 95% CI [0.01, 0.12], $p = 0.019$). In addition, self-stigma at T1 significantly predicted each QoL domain (β = −0.19 to −0.13, $p < 0.001$) and psychological distress at T3 (β = 0.24, 95% CI [1.94, 4.10], $p < 0.001$) through self-stigma at T2.

Conclusion The present study demonstrated the robust influence of self-stigma in increasing psychological distress and poor QoL in each specific domain, suggesting clinical approaches are needed for managing self-stigma, inattention and impulsivity symptoms, and suicide risk among individuals with schizophrenia.

Plain English summary

People with schizophrenia are likely to have inattention and impulsive behavior problems, which might cause difficulties in daily living because inattention and impulsive behavior problems may increase their self-stigma levels. However, no empirical evidence, especially longitudinal evidence, has been documented regarding the mediating roles of self-stigma in psychological distress and quality of life (QoL). Moreover, it is unclear if QoL is better to be examined using a global score or specific QoL domain score. Therefore, this study addressed the literature gap by testing the mediating role of self-stigma in the association of inattention/impulsivity with psychological distress and QoL (with global and specific domain scores comparison) over time.

Employing a longitudinal design across three timepoints (3 months apart between each timepoint), people with schizophrenia completed questionnaires assessing their inattention/impulsivity, self-stigma, psychological distress, suicidality, and specific domains of QoL (including physical, psychological, social, and environmental QoL). Using robust analytical methods (i.e., structural equation modeling), higher levels of inattention and impulsivity led to stronger self-stigma, which in turn contributed to greater psychological distress and poorer QoL (in both global score and specific domains of QoL) later. Moreover, treating QoL using specific domains performed a better fit than treating QoL as a whole in the structural equation modeling, indicating that QoL needs to be considered for individual domain scores instead of summing them up. These findings suggest that reducing self-stigma may be a helpful way to improve psychological distress and specific domains of QoL for people living with schizophrenia.

Keywords Self-stigma · Inattention and impulsivity symptoms · Suicide risk · Psychological distress · Quality of life

Introduction

Schizophrenia is a chronic and heavily stigmatized psychiatric condition resulting in various health problems, including inattention and impulsivity symptoms, suicide risk, psychological distress, and impaired quality of life (QoL) [1–4]. Beyond its debilitating impact, stigma remains a major barrier to care [5], with self-stigma resulting from the internalization of negative stereotypes, eroding self-esteem, confidence, and hindering recovery [6, 7]. Self-stigma additionally impacts employment, educational opportunities, healthcare, and social interactions [8]. Inattention and impulsivity symptoms represent a core cognitive deficit in schizophrenia, reflecting impaired inhibitory control and inefficient allocation of attentional resources [9–11]. While these features resemble symptoms seen in attention-deficit hyperactivity disorder (ADHD), previous studies indicate that the underlying neural mechanisms and longitudinal trajectories differ between ADHD and schizophrenia [12, 13]. Suicide is a leading cause of premature death in schizophrenia, with increased illness insight and difficulties in emotion regulation heightening psychological distress and vulnerability [14–16]. Psychological distress refers to emotional suffering related to illness, including stress, anxiety, and depression [1, 17], whereas QoL reflects an individual's overall well-being and functioning across multiple life domains [1]. Moreover, people with schizophrenia are found to have diminished QoL across physical, psychological, social, and environmental domains [18, 19].

In the present study, schizophrenia was defined according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) criteria; psychological distress was conceptualized as symptoms of depression, anxiety, and stress as assessed using the Depression, Anxiety, and Stress Scale-21 (DASS-21); and QoL was conceptualized in line with the World Health Organization definition referring to individuals' subjective evaluation of their position in life within the context of their culture, value systems, goals, and expectations. Inattention and impulsivity and psychological distress may overlap with negative symptoms in schizophrenia, but the present study focused on self-reported cognitive and affective experiences to examine their associations with QoL and self-stigma.

Psychological distress and QoL are important health indicators for people with schizophrenia. The literature

shows that people with schizophrenia are likely to have elevated psychological distress and a marked reduction in QoL [19, 20]. Previous research has reported that inattention and impulsivity among individuals with schizophrenia are associated with higher levels of psychological distress [21]. This distress, characterized by feelings of despair, inferiority, and helplessness, has been related to a diminished sense of mastery and greater suicide risk [16]. Psychological distress refers to the emotional strain linked to illness symptoms or anxiety, while QoL reflects functional ability and overall well-being [1, 17, 22]. Poor QoL and increased psychological distress have been shown to predict relapses, making it an important clinical outcome in schizophrenia [23]. Therefore, healthcare providers may want to know which factors may help improve QoL and reduce psychological distress among people with schizophrenia, and self-stigma is a key factor.

Self-stigma, defined as the internalization of negative societal attitudes toward mental illness, has emerged as a major psychosocial factor affecting both psychological distress and QoL [3, 7]. Individuals who internalize stigma often experience shame, hopelessness, and diminished self-esteem, which intensify psychological distress and hinder recovery [5]. Moreover, self-stigma negatively correlates with all domains of QoL, including psychological, physical, social, and environmental aspects [24, 25]. Therefore, targeting self-stigma is crucial for enhancing psychological well-being and QoL among individuals with schizophrenia. However, the literature lacks sufficient evidence regarding the role of self-stigma in the association of each specific QoL domain and their symptoms among individuals with schizophrenia, especially using a longitudinal design.

Self-stigma among people with schizophrenia may develop due to their symptoms and schizophrenia-related issues, including cognitive deficits (i.e., inattention and impulsivity symptoms) and suicide risk. Inattention and impulsivity symptoms may lead to self-stigma by increasing frustration, failures in academic, occupational, or social functioning, poor emotional regulation, fostering self-criticism, and feelings of inadequacy, thereby reinforcing dysfunctional self-perceptions and self-concept [9, 26–28]. A reduced self-concept increases vulnerability to internalizing public stereotypes of incompetence and low effort—key elements of self-stigma [29]. Notably, recent studies have indicated that elevated suicide risk may be associated with higher levels of self-stigma among individuals with schizophrenia.

According to the interpersonal theory of suicide, psychological factors such as hopelessness, perceived burdensomeness, and feelings of personal failure, core components contributing to suicide risk, may intensify negative self-evaluations and reinforce self-stigma [30, 31]. Studies have shown that individuals with greater suicidal ideation tend to report higher levels of shame and self-stigma, possibly because they interpret their psychological struggles as moral or personal failings [32, 33]. For example, self-stigma has been shown to be positively related to suicide risk among individuals with schizophrenia from the Czech Republic, Egypt, and Taiwan [3, 16, 34].

Based on the aforementioned literature, existing evidence suggests that self-stigma is closely linked to inattention and impulsivity symptoms, and increased suicide risk among individuals with schizophrenia, potentially exacerbating psychological distress and impairing functioning. These findings suggest that self-stigma may act as a mediator between cognitive vulnerabilities and adverse psychosocial outcomes. Despite these theoretical links, empirical studies explicitly testing self-stigma as a mediator are lacking [35], representing a notable gap in the literature. Moreover, most previous research has used cross-sectional designs, which provide limited evidence to infer causal relationships. Therefore, the present study addressed this knowledge gap by employing a longitudinal design to examine self-stigma's mediating role and its impact on subsequent psychological and behavioral outcomes. Such a design strengthens the evidence base and provides more robust insights for targeted interventions aimed at reducing self-stigma and improving clinical and psychosocial outcomes in schizophrenia.

Study purpose and hypotheses

To address this gap, the present study (as far as the present authors are aware) is the first longitudinal investigation examining the temporal relationships among self-stigma, inattention and impulsivity symptoms, suicide risk, psychological distress, and QoL, with a particular focus on the mediating role of self-stigma and comparing the global score of QoL with specific QoL domains among Taiwanese people with schizophrenia. Based on the extant literature, the present study proposed the following hypotheses (H_s: Fig. 1):

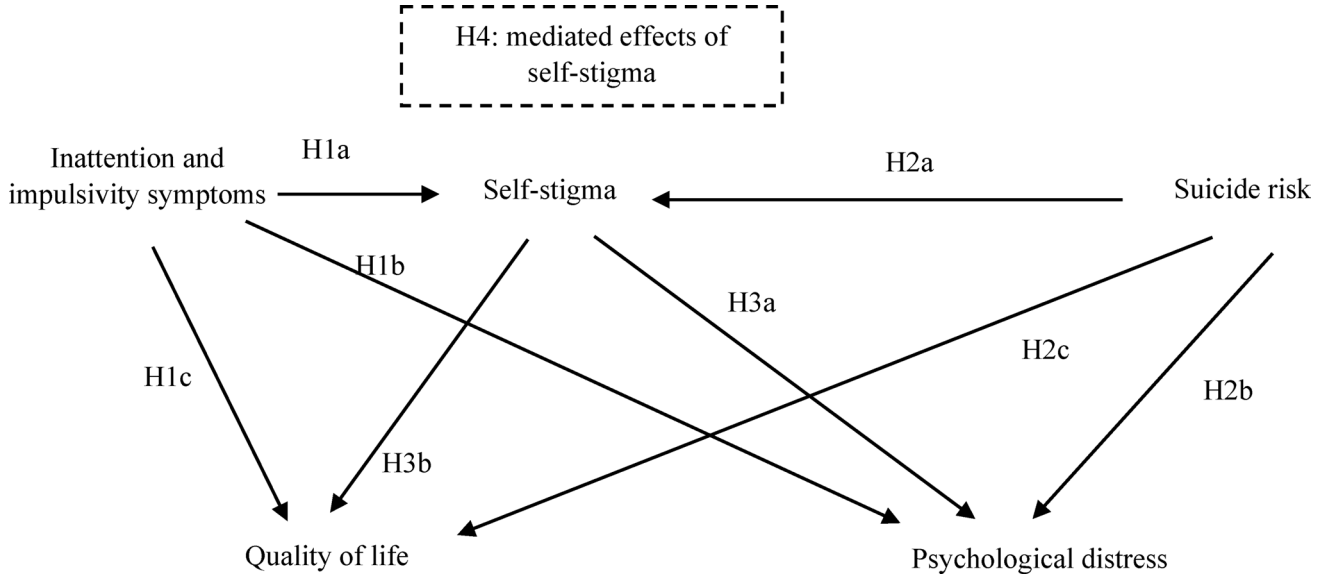

Fig. 1 Hypothetical framework illustrating the mediating role of self-stigma in relationships between inattention and impulsivity symptoms, psychological distress, and quality of life (QoL).
Note: Both original and alternative model share the same framework with the differences in the treatment of QoL. For the original model, QoL was treated as a whole (i.e., physical, psychological, social, and environment QoL embedded in the overall QoL construct). For the alternative model, QoL was treated individually across each specific domain (i.e., physical, psychological, social, and environment QoL were separated included in the model)

H_1 Inattention and impulsivity symptoms would be positively associated with self-stigma (H_{1a}), psychological distress (H_{1b}), and poor QoL (H_{1c}).

H_2 Suicide risk would be positively associated with self-stigma (H_{2a}), psychological distress (H_{2b}), and poor QoL (H_{2c}).

H_3 Self-stigma would be positively associated with psychological distress (H_{3a}) and poor QoL (H_{3b}).

H_4 Self-stigma would significantly mediate the relationships between inattention and impulsivity symptoms, and psychological distress (H_{4a}), between inattention and impulsivity symptoms, and QoL (H_{4b}).

Moreover, the present study compared the global QoL scores and each specific QoL domain scores. Accordingly, two competing models were constructed using structural equation modeling (SEM) to examine whether treating QoL as a single overall construct provides a better fit than treating QoL domains as separate constructs.

Methods

Participants and data collection

The present study was conducted at the Jianan Psychiatric Center (JPC) using a longitudinal follow-up design. Data were collected at three timepoints at a 3-month interval from March 2023 and September 2024 (baseline measure) to October 2023 and August 2025 (the third follow-up measure). To ensure privacy and to minimize the burden for this vulnerable population, all procedures were conducted at the JPC, the most convenient and secure setting for participant recruitment. As the only psychiatric teaching hospital in the Tainan region—and the central institution of the psychiatric care network serving over three million residents in southern Taiwan—the JPC provides extensive clinical services (including inpatient treatment, outpatient treatment, and daycare programs). The JPC currently delivers monthly outpatient treatment for more than 5000 patients with severe mental illness.

Potential participants were approached in both the daycare and outpatient units. Individuals were eligible for inclusion if they met all of the following criteria: (1) they had a confirmed diagnosis of schizophrenia established by at least one psychiatrist according to DSM-5 diagnostic criteria; (2) they were enrolled in a daycare program or received consistent outpatient follow-up, indicating clinical stability and minimal active psychotic symptoms; (3) they were 20 years old or older; and (4) they understood the study purpose and

provided handwritten informed consent for participation. Participants were excluded if they had a history of moderate to severe substance use disorder (excluding tobacco use disorder) or a history of head injury.

Measures

Demographic characteristics

Participants were asked questions about age, sex (male or female), age at schizophrenia onset, number of years of education, marital status, educational level, employment status, physical disease, and living status. Please see Supplementary Table S1 for the internal consistency regarding all the measures listed below in the present study.

Swanson, Nolan, and Pelham-IV MTA (SNAP-IV MTA) Questionnaire The SNAP-IV MTA was developed and updated based on the diagnostic criteria of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) [36] to screen for ADHD. The SNAP-IV MTA version consists of 26 items, covering the DSM-IV criteria for inattention, hyperactivity/impulsivity from ADHD. The scale includes three subscales: inattention (9 items), hyperactivity/impulsivity (9 items), and oppositional defiant symptoms (8 items). The SNAP-IV MTA was used in the present study because it is a widely used clinical tool in Taiwan to assess symptoms of inattention and hyperactivity/impulsivity [37]. All items are rated on a 4-point Likert-type scale ranging from 0 (*not at all*) to 3 (*very much*). The score is calculated by summing the item scores within the subscale, with higher scores indicating more severe symptoms. The SNAP-IV MTA has demonstrated good psychometric properties in both the English and Chinese versions. The internal consistency (Cronbach's α) ranged from 0.79 to 0.94 for parent rating and from 0.92 to 0.97 for teacher rating in the English version [38], and from 0.88 to 0.90 for parent rating and from 0.88 to 0.95 for teacher rating in the Chinese version [39, 40], showing acceptable reliability [41]. The SNAP-IV MTA is a widely used and validated clinical instrument in Taiwan for assessing inattention and hyperactivity/impulsivity symptoms [37]. Sample items from the SNAP-IV include "*Cannot concentrate*" and "*Difficulty awaiting turn*".

Mini International Neuropsychiatric Interview (MINI) The MINI is a short diagnostic structured interview developed according to the diagnostic criteria of the DSM-IV and International Classification of Diseases 10th revision (ICD-10) [42], with high sensitivity and specificity. It is designed to screen for 17 psychiatric disorders and can be administered by trained evaluators in approximately 20 min. The MINI was used in the present study because it is a brief and time-saving instrument to assess suicide risk prediction [43]. The MINI includes several diagnostic modules. In the present study, only the six items from the suicidality module of the MINI were used to assess participants' risk of suicide over the past month and across their lifetime. These items assess death wish, self-harm ideation, suicidal thoughts, suicide plans, and suicide attempts. Each question is answered with "*yes*" (scored 1) or "*no*" (scored 0), with higher scores indicating greater severity of suicide risk. The MINI has demonstrated good psychometric properties, with good to excellent overall diagnostic kappa coefficients, sensitivity, and specificity. The inter-rater reliability kappa coefficients range from 0.88 to 1.00, and test–retest reliability ranges from 0.76 to 0.93 [44]. Sample items from the suicidality module include "*Did you think (even momentarily) that you would be better off dead or wish you were dead or needed to be dead?*" and "*Did you have a suicide method in mind (i.e., how)?*".

Self-Stigma Scale-Short (SSS-S) The SSS-S was used in the present study because it is a brief measure assessing self-stigma with a strong theoretical framework (i.e., cognitive-behavior framework) that can be altered for different populations with strong psychometric properties [45–48]. It comprises nine items across three domains: cognition, affection, and behavior, with three items per domain. All items are rated on 4-point Likert-type scales ranging from 1 (*strongly disagree*) to 4 (*strongly agree*). The total and subscale scores are calculated by averaging item scores, with higher mean scores indicating higher self-stigma [49]. The SSS-S has demonstrated good psychometric properties for the three domain scores as well as the total score in both the original and Taiwanese versions. The internal consistency (Cronbach's α) ranged from 0.80 to 0.91 in the original version [49] and from 0.80 to 0.94 in the Taiwanese version [50]. A sample item of the SSS-S is "*My identity as schizophrenia is a burden to me*".

Depression, Anxiety, and Stress Scale-21 (DASS-21) The DASS-21 comprises 21 items assessing psychological distress symptoms [51] and is a shortened version of the DASS-42 [52]. The DASS-21 was used in the present study because it is a widely used instrument for assessing psychological distress across multiple dimensions, including depression, anxiety, and stress, and has demonstrated robust psychometric properties across diverse populations [53–57]. Each psychological symptom subscale (i.e., depression, anxiety, and stress) contains seven items. All DASS-21 items are rated on a 4-point Likert-type scale, ranging from 0 (*did not*

apply to me at all) to 3 (*applied to me very much or most of the time*). The score is calculated by summing the scores of the items in the subscale, with higher scores indicating higher levels of psychological symptoms [51, 58]. The scale has demonstrated good psychometric properties for all three subscales in both the original and Taiwanese versions. The internal consistency (Cronbach's α) ranged from 0.87 to 0.94 in the original version [51] and from 0.74 to 0.84 in the Taiwanese version [59], indicating acceptable reliability [41]. Sample items from the DASS-21 include "*I couldn't seem to experience any positive feeling at all*" (depression subscale), "*I was aware of dryness of my mouth*" (anxiety subscale), and "*I tended to over-react to situations*" (stress subscale).

World Health Organization Quality of Life Questionnaire-Brief Version (WHOQOL-BREF) The WHOQOL-BREF is a shortened version of the WHOQOL-100, comprising 26 items that assess four domains: physical health (7 items), psychological health (6 items), social relationships (4 items), and environment (9 items) [60]. The WHOQOL-BREF was used in the present study because it is a commonly used measure assessing QoL in different domains (physical, psychological, social, environment), adhering to the World Health Organization's definition [61]. The Taiwanese version of the WHOQOL-BREF consists of 28 items, including the original 26 items and two additional domestic items [62]. All WHOQOL-BREF items are rated on a 5-point Likert-type scale ranging from 1 to 5. Domain scores are calculated by summing the item responses within each domain and multiplying the result by four to standardize the scale. Higher scores indicate better QoL [60, 62]. The scale has demonstrated good psychometric properties in both the Taiwanese version and the population with schizophrenia. The internal consistency (Cronbach's α) ranged from 0.70 to 0.91 in the Taiwanese version [62], while similar reliability values (0.70–0.91) have been reported among individuals with schizophrenia [63]. A sample item of the WHOQOL-BREF is "*How satisfied are you with your sleep?*".

Sample size

According to Hair et al. [64], a sample size ranging from 100 to 200 participants is generally deemed sufficient for SEMs of low to moderate complexity, specifically models that include approximately 3–7 latent variables and 10–25 structural paths. Therefore, the sample of 241 participants in the present study exceeds this recommended threshold and can be considered adequate to ensure robust model estimation. The adequacy of the sample was further evaluated using rule-of-thumb ratios of cases to estimate parameters [65]. The model included approximately 18 estimated structural parameters (direct effects and covariate paths). Indirect effects were not counted as separate parameters because they are functions of the estimated direct coefficients (i.e., products of paths). Therefore, the count of estimated parameters in the model (*N* parameters = 18) includes only direct paths and covariate paths; indirect effects are tested post-estimation (i.e., via bootstrapping) but do not increase the number of free parameters estimated. Based on the 5:1 criterion, the minimum required sample size would be $5 \times 18 = 90$ participants. According to the stricter 10:1 criterion [65], the minimum required sample size would be $10 \times 18 = 180$ participants. The sample size in the present study ($N = 241$) exceeds both thresholds (ratio = 241/18 = 13.4), supporting the adequacy of the data for SEM.

Statistical analyses

The present longitudinal study was not preregistered. All study procedures, measures, and analytic strategies were defined prior to data analysis. Descriptive statistics and correlation coefficients were computed to characterize the study variables and their interrelationships. According to Cohen [66], correlation coefficients ranging from 0.10 to 0.29 indicate a weak correlation, those between 0.30 and 0.49 indicate a moderate correlation, and values of 0.50 or higher indicate a strong correlation. Checks of skewness and kurtosis showed that some measures exceeded the conventional thresholds for departures from univariate normality (i.e., ±3 for skewness and/or kurtosis; see Table 1 for details) [65, 67]. Consequently, the data were deemed suitable for the SEM using the robust maximum likelihood estimator (MLR), which is suitable for non-normally distributed data. Missing data were addressed using the robust two-stage robust (TSR) estimation procedure. This method provides full-information estimation under the assumption that data are missing at random (MAR) and adjusts standard errors and model fit indices to account for non-normality. Given that the dataset only had mild deviations from normality, this approach ensured unbiased parameter estimates while maintaining appropriate standard errors and fit statistics. Missing data were handled using full information maximum likelihood (FIML), allowing all available observations to contribute to parameter estimation. FIML assumes data are missing at random (MAR), which is considered appropriate given the observed missing data patterns and the inclusion of relevant observed variables in the model [65].

Moreover, a binary logistic regression was constructed to examine potential attrition bias at T3 (28.2% dropout). In the logistic regression, predictors of dropout included the following baseline (T1) variables: MINI, SSS-S, DASS-21,

Table 1 Descriptive statistics ($n=241$; 108 [44.8%] females and 133 [55.2%] males)

Variable	M (SD) or n (%)	Skewness	Kurtosis
Baseline age	46.35 (10.45)	−0.08	−0.42
Onset age	26.47 (6.32)	0.28	−0.72
Educational years	11.64 (2.74)	−0.23	−0.07
Phy_T1	13.37 (2.59)	−0.23	0.07
Psy_T1	12.19 (2.99)	−0.14	−0.19
Soc_T1	12.80 (2.85)	0.01	0.27
Env_T1	13.17 (2.43)	0.01	0.29
Aff_T1	2.25 (0.68)	−0.35	−0.34
Beh_T1	2.35 (0.78)	−0.29	−0.55
Cog_T1	2.12 (0.73)	0.07	−0.31
IMP/ATT_T1	2.14 (7.92)	5.65	37.54
Suicidality_T1	2.68 (4.74)	2.92	10.83
Dep_T1	8.95 (10.10)	1.36	1.41
Anx_T1	9.28 (8.71)	1.03	0.76
Str_T1	10.31 (9.57)	0.87	0.22
Aff_T2	2.23 (0.75)	−0.08	−0.49
Beh_T2	2.29 (0.82)	0.05	−0.58
Cog_T2	2.13 (0.77)	0.21	−0.46
Phy_T3	13.64 (2.59)	−0.42	0.17
Psy_T3	12.62 (3.21)	−0.44	0.19
Soc_T3	12.88 (2.86)	−0.50	0.66
Env_T3	13.25 (2.54)	−0.30	0.51
Living status_T1			
Alone	24 (10.0)		
With family	182 (75.5)		
With friends	3 (1.2)		
Others	32 (13.3)		
Marital status			
Married	42 (17.4)		
Single	167 (69.3)		
Others	32 (13.3)		
Physical disease_T1			
No	143 (59.3)		
Yes	98 (40.7)		
Employment status_T1			
Full-time	44 (18.3)		
Part-time	12 (5.0)		
Supportive employment	27 (11.2)		
Housekeeping	11 (4.6)		
Retired	6 (2.5)		
Currently unemployed	137 (56.8)		
Never worked	4 (1.6)		
Educational level_T1			
Primary school	11 (4.6)		
Junior high school	45 (18.7)		
Senior high school	108 (44.8)		
Associate degree	33 (13.7)		
Bachelor degree	42 (17.4)		
Master degree or above	2 (0.8)		

SD standard deviation, *SE* standard error, *Phy* physical quality of life, *Psy* psychological quality of life, *Soc* social quality of life, *Env* environment quality of life, *Aff* affective self-stigma, *Beh* behavior self-stigma, *Cog* cognitive self-stigma, *IMP/ATT* inattention and impulsivity symptoms, *Suicidality* suicide risk, *Dep* depression, *Anx* anxiety, *Str* stress, *T1* timepoint 1, *T2* timepoint 2, *T3* timepoint 3

SNAP-IV MTA, WHOQOL-BREF. None of them were significant (all p values >0.05 with odds ratios ranging from 0.81 to 1.27), indicating that dropout participants did not differ systematically from completers. Additionally, no significant differences were found in independent-samples t-tests that compared T3 completers and dropout participants on baseline variables (all p values >0.05), indicating that participants who dropped out did not differ systematically from those who completed the assessment. In addition, Little's Missing Completely At Random Test showed that the studied variables were missing completely at random ($\chi^2[10]=6.98$, $p=0.727$). These findings together support the assumption that missing data can be considered MAR, justifying the use of FIML estimation in the SEM analyses.

Hypotheses were tested via SEM implemented in the *lavaan* package for *R* [68], with 95% confidence intervals (CIs) for standard errors obtained through bootstrapping with 5000 resamples [69]. Sex, marital status, education, and age were included as control variables. Based on the hypothesized mediated model (Fig. 1), two models (original model using QoL as a whole; alternative model using each specific QoL domain in the model) were estimated and compared to using a robust chi-square difference test ($\Delta\chi^2$). Model fit was evaluated using multiple indices [65]: comparative fit index (CFI) ≥ 0.95 (acceptable ≥ 0.90), Tucker–Lewis index (TLI) ≥ 0.95 (acceptable ≥ 0.90), root mean square error of approximation (RMSEA) ≤ 0.06 (acceptable ≤ 0.10), and standardized root mean square residual (SRMR) <0.08 (acceptable <0.10). Standardized beta coefficients (β) were interpreted as small (0.10–0.29), moderate (0.30–0.50), or large (>0.50) [66].

Results

Demographics and attrition

Among the 241 participants, their baseline age was 46.35 years (SD = 10.45) (Table 1), and 68 were lost to follow-up in the subsequent measurements (attrition rate = 28.2%) (Fig. 2). Table 1 also reports the descriptive statistics. Table 2 additionally demonstrates Spearman's correlation matrix, which shows that all studied variables were significantly correlated.

Model fit and comparison

Despite the significant result of the chi-square test (χ^2 [258] = 501.50, $p<0.001$; $\chi^2/df=1.94$ for the model with global QoL score; χ^2 [206] = 373.69, $p<0.001$; $\chi^2/df=1.81$ for the model with specific QoL domain), the RMSEA was 0.08 (95% CI [0.07, 0.09]) and 0.06 (95% CI [0.05, 0.07]);

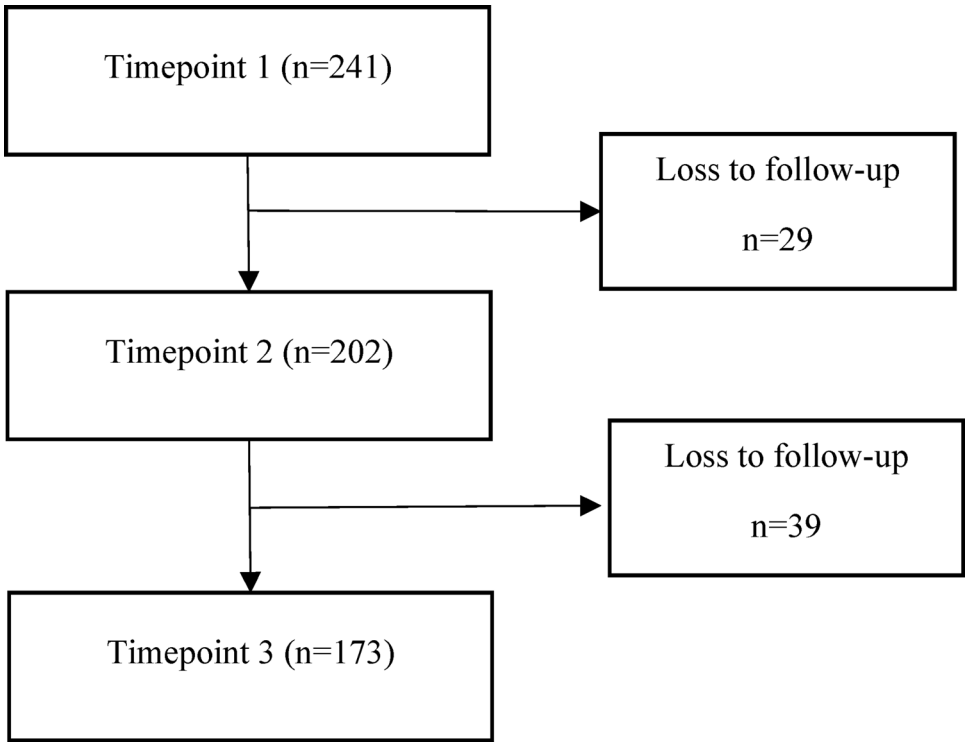

Fig. 2 Flowchart reporting loss to follow-up across three timepoints. Timepoint 1 = baseline; Timepoint 2 = 3 months after baseline; Timepoint 3 = 6 months after baseline

Table 2 Spearman's correlation matrix of study variable ($n = 241$)

	1	2	3	4	5	6	7	8	9
(1) IMP/ATT_T1	–								
(2) Suicidality_T1	0.22***	–							
(3) Aff_T2	0.21**	0.30***	–						
(4) Beh_T2	0.17*	0.40***	0.83***	–					
(5) Cog_T2	0.16*	0.33***	0.81***	0.72***	–				
(6) Phy_T3	−0.16*	−0.28***	−0.44***	−0.46***	−0.42***	–			
(7) Psy_T3	−0.17*	−0.33***	−0.45***	−0.48***	−0.48***	0.75***	–		
(8) Soc_T3	−0.05	−0.34***	−0.41***	−0.41***	−0.40***	0.69***	0.66***	–	
(9) Env_T3	−0.16*	−0.24**	−0.40***	−0.35***	−0.37***	0.75***	0.77***	0.74***	–

IMP/ATT inattention and impulsivity symptoms, *Suicidality* suicide risk, *Aff* affective self-stigma, *Beh* behavior self-stigma, *Cog* cognitive self-stigma, *Phy* physical quality of life, *Psy* psychological quality of life, *Soc* social quality of life, *Env* environment quality of life, *T1* timepoint 1, *T2* timepoint 2, *T3* timepoint 3

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

SRMR was 0.09 and 0.09; CFI was 0.91 and 0.94; TLI was 0.90 and 0.90 (Supplementary Table S2). Moreover, the alternative model using specific QoL domain outperformed the original model using global QoL scores ($\Delta\chi^2 = 127.81$; $\Delta df = 52$; $p < 0.001$), indicating the need of treating QoL beyond global scores.

Direct and indirect effects

The results of the SEM analysis indicated that inattention and impulsivity at T1 exhibited partial mediation on QoL [in both global QoL score (Table 3) and in each specific QoL domain (Table 4)] at T3 and psychological distress at T3 (i.e., significant direct and indirect effects), through self-stigma at T2. Conversely, suicide risk at T1 had significantly direct effects on psychological distress at T3 but not QoL (in both global QoL score and in each specific QoL domain) at T3. Moreover, self-stigma at T2 was not a significant mediator in the association of suicide risk at T1 with QoL (in both global QoL score and in each specific QoL domain) and psychological distress at T3. Please refer to Supplementary Material S1 for further details (i.e., direct effects and indirect effects for both original and alternative models) and Table 5 for a summary of the significance of direct and indirect effects in the two models tested in the present study (Fig. 3).

Table 3 Direct and indirect effect with covariate of the original hypothesized model using quality of life as a whole ($n=241$)

Path	B	SE	Lower CI	Upper CI	β	z	*p*
Direct effect							
IMP/ATT_T1 → Self-stigma_T2	0.01	0.00	0.01	0.02	0.13	2.39	0.017
Suicidality_T1 → Self-stigma_T2	0.12	0.18	−0.22	0.47	0.05	0.69	0.488
Self-stigma_T1 → Self-stigma_T2	0.55	0.07	0.41	0.69	0.51	7.70	<0.001
Self-stigma_T2 → QoL_T3	−0.93	0.15	−1.23	−0.63	−0.31	−6.05	<0.001
Suicidality_T1 → QoL_T3	−0.85	0.55	−1.93	0.23	−0.11	−1.55	0.122
QoL_T1 → QoL_T3	0.48	0.07	0.34	0.62	0.47	6.84	<0.001
IMP/ATT_T1 → QoL_T3	−0.03	0.01	−0.06	−0.01	−0.13	−3.05	0.002
Self-stigma_T2 → Psychological distress_T3	5.44	0.56	4.35	6.53	0.46	9.80	<0.001
Suicidality_T1 → Psychological distress_T3	8.25	2.61	3.13	13.37	0.28	3.16	0.002
IMP/ATT_T1 → Psychological distress_T3	0.10	0.04	0.03	0.18	0.10	2.69	0.007
Indirect effect							
IMP/ATT_T1 → Self-stigma_T2 → QoL_T3	−0.01	0.00	−0.02	−0.01	−0.04	−2.28	0.023
IMP/ATT_T1 → Self-stigma_T2 → Psychological distress_T3	0.06	0.03	0.01	0.12	0.06	2.35	0.019
Suicidality_T1 → Self-stigma_T2 → QoL_T3	−0.11	0.16	−0.43	0.21	−0.01	−0.70	0.485
Suicidality_T1 → Self-stigma_T2 → Psychological distress_T3	0.67	0.95	−1.20	2.53	0.02	0.70	0.484
Self-stigma_T1 → Self-stigma_T2 → QoL_T3	−0.51	0.11	−0.73	−0.29	−0.16	−4.55	<0.001
Self-stigma_T1 → Self-stigma_T2 → Psychological distress_T3	2.98	0.55	1.90	4.05	0.24	5.43	<0.001
Covariate							
Sex → QoL_T3	−0.07	0.22	−0.50	0.36	−0.02	−0.33	0.738
Sex → Psychological distress_T3	−0.75	0.84	−2.39	0.89	−0.04	−0.90	0.369
Education → QoL_T3	−0.14	0.10	−0.34	0.06	−0.07	−1.41	0.159
Education → Psychological distress_T3	−0.02	0.38	−0.75	0.72	−0.00	−0.04	0.967
Age → QoL_T3	0.01	0.01	−0.02	0.03	0.03	0.43	0.670
Age → Psychological distress_T3	−0.09	0.05	−0.18	−0.00	−0.12	−2.05	0.040
Marriage → QoL_T3	0.01	0.06	−0.11	0.13	0.01	0.14	0.886
Marriage → Psychological distress_T3	0.29	0.27	−0.23	0.81	0.07	1.09	0.275

B Beta estimate, *SE* standard error, *β* standardized beta estimate; *CI* Confidence interval at 95%, *IMP/ATT* inattention and impulsivity symptoms, *Suicidality* suicide risk, *QoL* quality of life, *Psychological distress* depression, anxiety, and stress, *T1* timepoint 1, *T2* timepoint 2, *T3* timepoint 3

A positive direct effect (e.g., IMP/ATT_T1 → Self-stigma_T2) means that higher scores on the predictor are associated with higher scores on the outcome; a negative direct effect indicates an inverse association. An indirect effect (e.g., IMP/ATT_T1 → Self-stigma_T2 → QoL_T3) quantifies how much of the predictor's effect on the outcome is transmitted via a mediator (for example, if predictor → mediator → outcome is significant, part of predictor's impact on outcome works by changing the mediator)

Discussion

The main findings indicated that self-stigma played a key mediating role in the relationships of inattention and impulsivity symptoms with both psychological distress and QoL among Taiwanese individuals with schizophrenia. Also, the SEM findings indicated that the model with four specific QoL domains (i.e., physical, psychological, social, and environmental) performed better than the model using a global QoL score. More specifically, self-stigma was positively associated with inattention and impulsivity symptoms and psychological distress. Moreover, self-stigma was negatively associated with physical, psychological, environmental, and social QoL. While suicide risk was not significantly associated with any of these variables, except for environmental and social QoL at the third timepoint.

Despite increasing recognition of the central role of self-stigma, the present study filled the gap regarding the mediating role of self-stigma explaining the associations between inattention and impulsivity symptoms, psychological distress, and specific QoL domains using a longitudinal design. It is important to distinguish the present findings from research on negative symptoms in schizophrenia. Although inattention and impulsivity symptoms and psychological distress may overlap phenomenologically with negative symptom domains, the present study focused on dimensional self-reported cognitive and affective experiences rather than clinician-rated negative symptoms.

Globally, self-stigma is recognized as a significant public health concern that undermines psychosocial functioning and overall well-being [6]. By internalizing negative societal attitudes toward mental illness, individuals with schizophrenia experience heightened psychological distress, which can disrupt key physiological systems such as immune functioning, metabolism, sleep regulation, and cardiovascular health, ultimately reducing physical QoL

Table 4 Direct and indirect effect with covariate of the alternative hypothesized model using specific quality of life domains ($n=241$)

Path	B	SE	Lower CI	Upper CI	β	z	*p*
Direct effects							
IMP/ATT_T1 → Self-stigma_T2	0.01	0.01	0.00	0.02	0.13	2.29	0.022
Suicidality_T1 → Self-stigma_T2	0.14	0.19	−0.23	0.50	0.05	0.73	0.466
Self-stigma_T1 → Self-stigma_T2	0.55	0.07	0.41	0.68	0.51	7.74	<0.001
Self-stigma_T2 → Psychological distress_T3	5.54	0.56	4.43	6.64	0.46	9.81	<0.001
Suicidality_T1 → Psychological distress_T3	8.34	2.72	3.00	13.68	0.28	3.06	0.002
IMP/ATT_T1 → Psychological distress_T3	0.10	0.04	0.02	0.19	0.10	2.31	0.021
Self-stigma_T2 → Phy_T3	−1.26	0.20	−1.66	−0.87	−0.36	−6.31	<0.001
Suicidality_T1 → Phy_T3	−1.08	0.68	−2.41	0.25	−0.12	−1.59	0.112
IMP/ATT_T1 → Phy_T3	−0.03	0.01	−0.06	−0.01	−0.11	−2.39	0.017
Phy_T1 → Phy_T3	0.29	0.05	0.20	0.38	0.30	6.43	<0.001
Self-stigma_T2 → Psy_T3	−1.63	0.25	−2.11	−1.14	−0.38	−6.53	<0.001
Suicidality_T1 → Psy_T3	−1.24	0.78	−2.76	0.28	−0.11	−1.60	0.109
IMP/ATT_T1 → Psy_T3	−0.04	0.02	−0.07	−0.01	−0.10	−2.38	0.017
Psy_T1 → Psy_T3	0.28	0.05	0.19	0.37	0.27	5.99	<0.001
Self-stigma_T2 → Soc_T3	−1.08	0.21	−1.49	−0.66	−0.27	−5.07	<0.001
Suicidality_T1 → Soc_T3	−1.49	0.72	−2.90	−0.08	−0.15	−2.07	0.038
IMP/ATT_T1 → Soc_T3	−0.04	0.02	−0.07	−0.00	−0.11	−1.99	0.046
Soc_T1 → Soc_T3	0.39	0.05	0.29	0.50	0.40	7.56	<0.001
Self-stigma_T2 → Env_T3	−0.87	0.20	−1.27	−0.48	−0.25	−4.31	<0.001
Suicidality_T1 → Env_T3	−1.18	0.59	−2.35	−0.02	−0.14	−1.99	0.046
IMP/ATT_T1 → Env_T3	−0.06	0.01	−0.09	−0.03	−0.20	−4.06	<0.001
Env_T1 → Env_T3	0.32	0.05	0.23	0.42	0.32	6.50	<0.001
Indirect effects							
IMP/ATT_T1 → Self-stigma_T2 → Psychological distress_T3	0.06	0.03	0.01	0.12	0.06	2.24	0.025
IMP/ATT_T1 → Self-stigma_T2 → Phy_T3	−0.01	0.01	−0.03	−0.00	−0.05	−2.18	0.030
IMP/ATT_T1 → Self-stigma_T2 → Psy_T3	−0.02	0.01	−0.04	−0.00	−0.05	−2.13	0.033
IMP/ATT_T1 → Self-stigma_T2 → Soc_T3	−0.01	0.01	−0.02	−0.00	−0.04	−2.14	0.032
IMP/ATT_T1 → Self-stigma_T2 → Env_T3	−0.01	0.01	−0.02	−0.00	−0.03	−1.99	0.046
Suicidality_T1 → Self-stigma_T2 → Psychological distress_T3	0.75	1.02	−1.25	2.74	0.02	0.73	0.463
Suicidality_T1 → Self-stigma_T2 → Phy_T3	−0.17	0.23	−0.63	0.28	−0.02	−0.74	0.462
Suicidality_T1 → Self-stigma_T2 → Psy_T3	−0.22	0.30	−0.80	0.36	−0.02	−0.74	0.458
Suicidality_T1 → Self-stigma_T2 → Soc_T3	−0.15	0.20	−0.54	0.25	−0.01	−0.72	0.470
Suicidality_T1 → Self-stigma_T2 → Env_T3	−0.12	0.16	−0.43	0.20	−0.01	−0.73	0.464
Self-stigma_T1 → Self-stigma_T2 → Psychological distress_T3	3.02	0.55	1.94	4.10	0.24	5.47	<0.001
Self-stigma_T1 → Self-stigma_T2 → Phy_T3	−0.69	0.15	−0.98	−0.40	−0.18	−4.71	<0.001
Self-stigma_T1 → Self-stigma_T2 → Psy_T3	−0.89	0.18	−1.25	−0.52	−0.19	−4.80	<0.001
Self-stigma_T1 → Self-stigma_T2 → Soc_T3	−0.59	0.14	−0.86	−0.31	−0.14	−4.18	<0.001
Self-stigma_T1 → Self-stigma_T2 → Env_T3	−0.48	0.13	−0.73	−0.22	−0.13	−3.69	<0.001
Covariates							
Sex → Psychological distress_T3	−0.76	0.87	−2.46	0.95	−0.04	−0.87	0.385
Age → Psychological distress_T3	−0.09	0.05	−0.20	0.01	−0.12	−1.81	0.070
Marriage → Psychological distress_T3	0.29	0.27	−0.24	0.81	0.06	1.07	0.286
Education → Psychological distress_T3	−0.03	0.41	−0.83	0.77	−0.00	−0.07	0.942
Sex → Phy_T3	0.09	0.27	−0.43	0.61	0.02	0.34	0.737
Age → Phy_T3	−0.00	0.02	−0.04	0.03	−0.02	−0.25	0.800
Marriage → Phy_T3	0.04	0.08	−0.12	0.20	0.03	0.46	0.644
Education → Phy_T3	−0.07	0.13	−0.32	0.17	−0.03	−0.56	0.573
Sex → Psy_T3	0.03	0.32	−0.60	0.66	0.00	0.09	0.930
Age → Psy_T3	−0.01	0.02	−0.05	0.03	−0.04	−0.50	0.620
Marriage → Psy_T3	0.00	0.10	−0.19	0.19	0.00	0.03	0.977
Education → Psy_T3	−0.17	0.16	−0.49	0.16	−0.06	−1.01	0.313
Sex → Soc_T3	−0.19	0.28	−0.74	0.36	−0.03	−0.68	0.493
Age → Soc_T3	0.00	0.02	−0.03	0.04	0.01	0.16	0.870
Marriage → Soc_T3	−0.13	0.08	−0.29	0.04	−0.09	−1.53	0.126

Table 4 (continued)

Path	B	SE	Lower CI	Upper CI	β	z	*p*
Education → Soc_T3	−0.37	0.12	−0.61	−0.12	−0.15	−2.96	0.003
Sex → Env_T3	0.10	0.27	−0.44	0.63	0.02	0.36	0.716
Age → Env_T3	0.02	0.02	−0.01	0.05	0.08	1.21	0.227
Marriage → Env_T3	0.02	0.07	−0.12	0.16	0.02	0.29	0.773
Education → Env_T3	−0.08	0.13	−0.33	0.16	−0.04	−0.67	0.501

B beta estimate, *SE* standard error, *β* standardized beta estimate, *CI* confidence interval at 95%, *Phy* physical quality of life, *Psy* psychological quality of life, *Soc* social quality of life, *Env* environment quality of life, *IMP/ATT* inattention and impulsivity symptoms, *Suicidality* suicide risk, *Psychological distress* depression, anxiety, and stress, *T1* timepoint 1, *T2* timepoint 2, *T3* timepoint 3

A positive direct effect (e.g., IMP/ATT_T1 → Self-stigma_T2) means that higher scores on the predictor are associated with higher scores on the outcome; a negative direct effect indicates an inverse association. An indirect effect (e.g., IMP/ATT_T1 → Self-stigma_T2 → QoL_T3) quantifies how much of the predictor's effect on the outcome is transmitted via a mediator (for example, if predictor → mediator → outcome is significant, part of predictor's impact on outcome works by changing the mediator)

Table 5 A summary of the significance of direct and indirect effects in the two models tested in the present study

Path	*p* value				
	Overall QoL	Physical QoL	Psychological QoL	Social QoL	Environment QoL
Direct effect					
IMP/ATT_T1 → Self-stigma_T2	0.017*	0.022*	0.022*	0.022*	0.022*
Suicidality_T1 → Self-stigma_T2	0.488	0.466	0.466	0.466	0.466
Self-stigma_T1 → Self-stigma_T2	<0.001***	<0.001***	<0.001***	<0.001***	<0.001***
Self-stigma_T2 → QoL_T3	<0.001***	<0.001***	<0.001***	<0.001***	<0.001***
Suicidality_T1 → QoL_T3	0.122	0.112	0.109	0.038*	0.046*
QoL_T1 → QoL_T3	<0.001***	<0.001***	<0.001***	<0.001***	<0.001***
IMP/ATT_T1 → QoL_T3	0.002**	0.017*	0.017*	0.046*	<0.001***
Self-stigma_T2 → Psychological distress_T3	<0.001***	<0.001***	<0.001***	<0.001***	<0.001***
Suicidality_T1 → Psychological distress_T3	0.002**	0.002**	0.002**	0.002**	0.002**
IMP/ATT_T1 → Psychological distress_T3	0.007**	0.021*	0.021*	0.021*	0.021*
Indirect effect					
IMP/ATT_T1 → Self-stigma_T2 → QoL_T3	0.023*	0.030*	0.033*	0.032*	0.046*
Suicidality_T1 → Self-stigma_T2 → QoL_T3	0.484	0.462	0.458	0.470	0.464
Self-stigma_T1 → Self-stigma_T2 → QoL_T3	<0.001***	<0.001***	<0.001***	<0.001***	<0.001***

QoL quality of life, *IMP/ATT* inattention and impulsivity symptoms, *Suicidality* suicide risk, *Psychological distress* depression, anxiety, and stress, *T1* timepoint 1, *T2* timepoint 2, *T3* timepoint 3

*$p<0.05$, **$p<0.01$, ***$p<0.001$

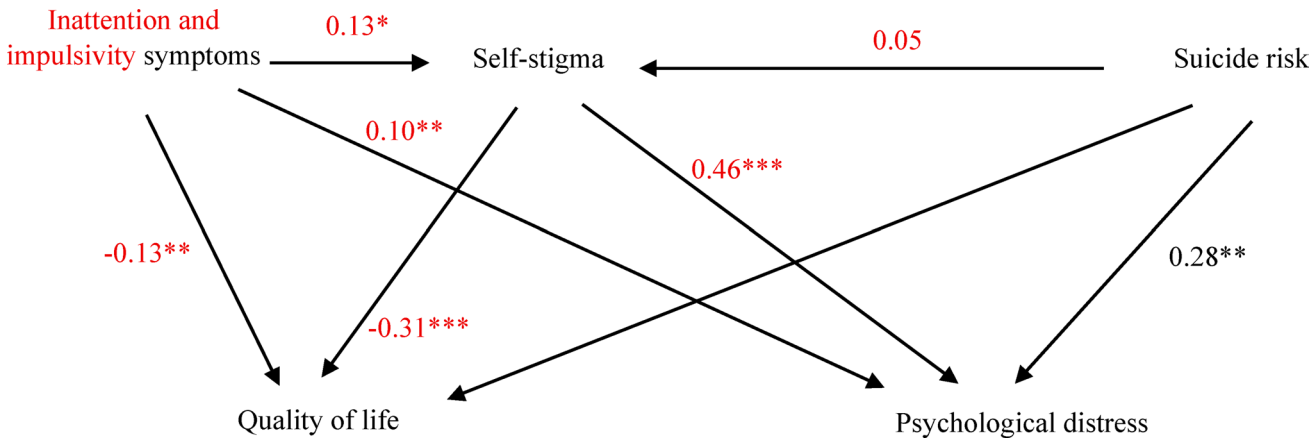

Fig. 3 The mediating role of self-stigma in relationships between inattention and impulsivity symptoms, psychological distress, and quality of life (QoL).
Note: Both original and alternative model share the same framework with the differences in the treatment of QoL. For the original model, QoL was treated as a whole (i.e., physical, psychological, social, and environment QoL embedded in the overall QoL construct). For the alternative model, QoL was treated individually across each specific domain (i.e., physical, psychological, social, and environment QoL were separated included in the model). *$p<0.05$; **$p<0.01$; and ***$p<0.001$

[19, 24, 25, 70–72]. Conceptually, self-stigma encompasses stereotyping, labeling, status loss, separation, and discrimination, which foster feelings of shame, marginalization, secrecy, and social withdrawal [72–74]. Individuals who internalize these stigmatizing attitudes often view themselves as incapable or unworthy of fulfilling meaningful social roles, which in turn leads to lower self-esteem, worthlessness, hopelessness, and increased psychiatric symptoms (i.e., anxiety and depression) [16, 35, 75]. Moreover, self-stigma reduces participation in community activities and perceived social support due to feelings of shame or fear of judgment, resulting in isolation and loneliness [76, 77]. The erosion of these emotional and social resources weakens social networks, which are closely associated with poorer social QoL [77, 78]. These social impairments further affect environmental QoL because social connectedness and engagement with one's surroundings are interrelated [77]. Therefore, the present findings concur with extant empirical evidence showing that self-stigma is negatively associated with physical, psychological, social, and environmental QoL, while being positively associated with psychological distress [79–81].

Inattention and impulsivity symptoms, core cognitive deficits in schizophrenia, reflect impairments in inhibitory control and inefficient allocation of attentional resources [9]. Such deficits contribute to learning difficulties, poor social functioning, and repeated experiences of failure or criticism, which undermine self-confidence and self-worth [21, 82]. Over time, these negative experiences foster internalization of societal stereotypes and self-blame, leading to heightened self-stigma [83]. Empirical evidence specifically shows that individuals with inattention and impulsivity symptoms often report greater self-stigma and emotional dysregulation, which predict increased depression and anxiety [63, 67]. Inattention and impulsivity symptoms also interfere with effective communication and social participation, increasing feelings of isolation and social withdrawal [84]. Such social difficulties exacerbate psychological distress, particularly among individuals experiencing symptoms of schizophrenia, where inattention and impulsivity symptoms are closely associated with negative and psychotic-like symptoms, influencing psychological and social QoL [85].

Moreover, inattention and impulsivity symptoms indirectly reduce QoL by impairing coping strategies, reducing resilience, and limiting an individual's ability to maintain relationships or daily functioning [86]. Individuals with inattention and impulsivity symptoms tend to have irregular activity patterns and lower levels of sustained physical activity due to difficulties with planning and maintaining routines. This reduced activity is associated with poorer physical fitness, higher risk of weight gain, and increased vulnerability to illness, negatively impacting physical QoL [87]. Collectively, evidence indicates that inattention and impulsivity symptoms not only contribute to self-stigmatizing beliefs but also intensify psychological distress and lead to poorer outcomes in each QoL domain among individuals with schizophrenia.

While self-stigma, psychological distress, and each poor QoL domain are recognized contributors to mental health problems, suicide risk is not necessarily linked to these factors. A plausible explanation is that suicide risk may result from a complex interplay of multiple influences, including genetic, biological, situational, and psychosocial factors based on the ecological systems theory, the diathesis–stress model, and interpersonal–psychological model [14, 88–91]. For instance, acute stressors or neurochemical dysregulation may trigger suicide risk independently of chronic psychological distress or self-stigma.

Conversely, protective factors such as social support, effective coping, and problem-solving skills can buffer the impact of poor QoL or self-stigma on suicidal risk [92, 93]. The absence of significant associations between suicide risk and poor QoL, psychological distress, and self-stigma warrants discussion. One possible explanation is that the participants in the present study were clinically stable and receiving regular outpatient or day-care treatment, which may have reduced variability in suicide risk. Prior research suggests that suicidal ideation in schizophrenia is more strongly associated with acute symptom exacerbation or clinical instability [94]. Additionally, individuals identified as being at elevated suicide risk often receive intensified clinical interventions, such as closer monitoring or hospitalization, which may attenuate observable associations among cross-sectional community samples [34]. Therefore, the restricted clinical variability in the present sample may partly explain the non-significant findings.

Implications

The present study underscores the complex interconnections among self-stigma, inattention and impulsivity symptoms, psychological distress, specific QoL domains (i.e., physical, psychological, social, and environmental QoL), and suicide risk. The findings suggest that self-stigma functions as a pivotal psychological construct linking inattention and impulsivity symptoms to psychological distress and poor QoL domains. This insight advances theoretical understanding by integrating cognitive and psychosocial domains of mental health and highlighting their joint contribution to psychological distress and poor QoL domains. From a practical standpoint, the study emphasizes the need for designing targeted interventions that simultaneously address inattention and impulsivity symptoms and internalized stigma. Such

approaches may reduce psychological distress and enhance QoL. Recognizing the mediating role of self-stigma also offers critical guidance for developing stigma-reduction programs and cognitive-behavioral strategies tailored to individuals with attentional or emotional challenges. By addressing self-stigma as a mediator, mental health practitioners may facilitate psychological recovery and promote overall well-being among vulnerable populations.

Limitations

The present study has a number of limitations. First, the regional focus of the study on a single psychiatric center in Taiwan, combined with the use of convenience sampling, may limit the representativeness of the sample, thereby potentially reducing the generalizability of the findings. Second, self-report instruments were used for all measures, making the data vulnerable to biases related to social desirability and misrepresentation, particularly for sensitive scales assessing self-stigma and suicide risk. Third, just over a quarter of the participants (68/241; 28.2%) did not complete all follow-up assessments, and attrition may have introduced bias and impacted the findings. Fourth, the study focused on psychosocial factors, but other influences on suicide risk, including biological, neurocognitive, and environmental aspects, were not investigated. Fifth, information regarding antipsychotic medication use, duration of illness, and psychiatric comorbidities was not available. Because these factors may be associated with cognitive deficits, psychological distress, and QoL, future studies should account for these variables to provide a more comprehensive understanding. Additionally, the follow-up period may not reflect long-term outcomes despite being sufficient for short- to medium-term changes. Future research should aim to replicate these findings in diverse populations across different countries and age groups, incorporate objective or multi-method assessments, and examine additional mediators or moderators. Such studies would provide a more comprehensive understanding of the complex pathways linking self-stigma, inattention and impulsivity symptoms, psychological distress, poor specific QoL domains, and suicide risk.

Conclusion

The present study found that self-stigma mediated the associations between inattention/impulsivity symptoms and psychological distress, and between inattention/impulsivity symptoms and specific QoL domains among Taiwanese individuals with schizophrenia. The study is among the first to longitudinally explore these variables, finding that self-stigma was positively associated with inattention and impulsivity symptoms, psychological distress, and poor QoL in specific domains, whereas suicide risk remained unrelated to these factors. Healthcare providers and other stakeholders should consider the importance of reducing self-stigma among individuals with schizophrenia to improve their psychological well-being and QoL. Notably, future research should implement interventions that simultaneously target attention and impulsivity symptoms, alongside self-stigma, to examine whether combined approaches can more effectively enhance psychological well-being and QoL among this population.

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Data availability The data that support the findings of the present study are available upon reasonable request from the corresponding author.

Declarations

Conflict of interest The authors declare no conflicts of interest.

Ethical approval Approval for the study was granted by the Institutional Review Board of the Jianan Psychiatric Center (Ref. No: 20-029), in compliance with the ethical guidelines of the Declaration of Helsinki (World Medical Association, 2013) and the ethical standards of the American Psychological Association (APA).

Consent to participate Informed consent was obtained from all individual participants included in the study.

References

1. Holubova, M., Prasko, J., Matousek, S., Latalova, K., Marackova, M., Vrbova, K., & Zatkova, M. (2016). Comparison of self-stigma and quality of life in patients with depressive disorders and schizophrenia spectrum disorders—A cross-sectional study. *Neuropsychiatric Disease and Treatment, 12*, 3021–3030. https://doi.org/10.2147/NDT.S121556
2. Kruse, E. A., & Dodell-Feder, D. (2025). Schizophrenia spectrum stigma in healthcare: A systematic review. *Frontiers in Psychiatry, 16*, 1–22. https://doi.org/10.3389/fpsyt.2025.1648957
3. Lien, Y.-J., Chang, H.-A., Kao, Y.-C., Tzeng, N.-S., Yeh, C.-B., & Loh, C.-H. (2018). Self-stigma mediates the impact of insight on current suicide ideation in suicide attempters with schizophrenia: Results of a moderated mediation approach. *Suicide and Life-Threatening Behavior, 48*(6), 661–676. https://doi.org/10.1111/sltb.12384
4. Yen, S.-Y., Huang, X.-Y., & Chien, C.-H. (2020). The self-stigmatization of patients with schizophrenia: A phenomenological study. *Archives of Psychiatric Nursing, 34*(2), 29–35. https://doi.org/10.1016/j.apnu.2020.02.010
5. Caqueo-Urízar, A., Boyer, L., Urzúa, A., & Williams, D. R. (2019). Self-stigma in patients with schizophrenia: A multicentric study from three Latin-America countries. *Social Psychiatry and Psychiatric Epidemiology, 54*(8), 905–909. https://doi.org/10.1007/s00127-019-01671-4
6. Ociskova, M., Prasko, J., Holubova, M., Latalova, K., Sollar, T., Zatkova, M., & Bocek, J. (2023). Self-stigma in patients with schizophrenia: Impact and management. *Neuroendocrinology Letters, 44*(6), 368–383.
7. Roškar, S., Kralj, D., Andriessen, K., Krysinska, K., Vinko, M., & Podlesek, A. (2022). Anticipated self and public stigma in suicide prevention professionals. *Frontiers in Psychiatry, 13*, Article 931245. https://doi.org/10.3389/fpsyt.2022.931245
8. Lebowitz, M. S. (2016). Stigmatization of ADHD: A developmental review. *Journal of Attention Disorders, 20*(3), 199–205. https://doi.org/10.1177/1087054712475211
9. Michael, G. A., Dorey, J.-M., Rey, R., D'Amato, T., Fabre, D., Brunet, S., & Padovan, C. (2020). Attention in schizophrenia: Impaired inhibitory control, faulty attentional resources, or both? *Psychiatry Research, 290*, Article 113164. https://doi.org/10.1016/j.psychres.2020.113164
10. Niarchou, M., Calkins, M. E., Moore, T. M., Tang, S. X., McDonald-McGinn, D. M., Zackai, E. H., & Gur, R. E. (2018). Attention deficit hyperactivity disorder symptoms and psychosis in 22q11.2 deletion syndrome. *Schizophrenia Bulletin, 44*(4), 824–833. https://doi.org/10.1093/schbul/sbx113
11. Shyu, Y.-C., Yuan, S.-S., Lee, S.-Y., Yang, C.-J., Yang, K.-C., Lee, T.-L., & Wang, L.-J. (2015). Attention-deficit/hyperactivity disorder, methylphenidate use and the risk of developing schizophrenia spectrum disorders: A nationwide population-based study in Taiwan. *Schizophrenia Research, 168*(1–2), 161–167. https://doi.org/10.1016/j.schres.2015.08.033
12. Egeland, J. (2007). Differentiating attention deficit in adult ADHD and schizophrenia. *Archives of Clinical Neuropsychology, 22*(6), 763–771. https://doi.org/10.1016/j.acn.2007.06.004
13. Øie, M., Sundet, K., & Rund, B. R. (1999). Contrasts in memory functions between adolescents with schizophrenia or ADHD. *Neuropsychologia, 37*(12), 1351–1358. https://doi.org/10.1016/S0028-3932(99)00043-3
14. Jian, C.-R., Wang, P.-W., Lin, H.-C., Huang, M.-F., Yeh, Y.-C., Liu, T.-L., & Yen, C.-F. (2022). Association between self-stigma and suicide risk in individuals with schizophrenia: Moderating effects of self-esteem and perceived support from friends. *International Journal of Environmental Research and Public Health, 19*(22), Article 15071. https://doi.org/10.3390/ijerph192215071
15. Leslie, E., Weittenhiller, L. P., Sloan, A. F., & Sheffield, J. M. (2025). Delusional distress is associated with emotion dysregulation in schizophrenia-spectrum disorders. *Schizophrenia Bulletin Open, 6*(1), 1–11. https://doi.org/10.1093/schizbullopen/sgaf010
16. Sharaf, A. Y., Ossman, L. H., & Lachine, O. A. (2012). A cross-sectional study of the relationships between illness insight, internalized stigma, and suicide risk in individuals with schizophrenia. *International Journal of Nursing Studies, 49*(12), 1512–1520. https://doi.org/10.1016/j.ijnurstu.2012.08.006
17. Georgiades, A., Almuqrin, A., Rubinic, P., Mouhitzadeh, K., Tognin, S., & Mechelli, A. (2023). Psychosocial stress, interpersonal sensitivity, and social withdrawal in clinical high risk for psychosis: A systematic review. *Schizophrenia, 9*(1), Article 38. https://doi.org/10.1038/s41537-023-00362-z
18. Dong, M., Lu, L., Zhang, L., Zhang, Y.-S., Ng, C. H., Ungvari, G. S., & Xiang, Y.-T. (2019). Quality of life in schizophrenia: A meta-analysis of comparative studies. *Psychiatric Quarterly, 90*(3), 519–532. https://doi.org/10.1007/s11126-019-09633-4
19. Gagiu, C., Dionisie, V., Manea, M. C., Mazilu, D. C., & Manea, M. (2024). Internalised stigma, self-esteem and perceived social support as psychosocial predictors of quality of life in adult patients with schizophrenia. *Journal of Clinical Medicine, 13*(22), Article 6959. https://doi.org/10.3390/jcm13226959
20. Suttajit, S., & Pilakanta, S. (2015). Predictors of quality of life among individuals with schizophrenia. *Neuropsychiatric Disease and Treatment, 11*, 1371–1379. https://doi.org/10.2147/NDT.S81024
21. Mueller, A. K., Fuermaier, A. B. M., Koerts, J., & Tucha, L. (2012). Stigma in attention deficit hyperactivity disorder. *ADHD Attention Deficit and Hyperactivity Disorders, 4*(3), 101–114. https://doi.org/10.1007/s12402-012-0085-3
22. Nguyen-Thi, T.-T., Nguyen, D. T., Le, H. M., Le, C. M., Hua, T. D., Nguyen-Hoang, B.-N., & Tran-Chi, V.-L. (2024). Academic stress and attitudes toward seeking professional psychological help among Vietnamese students: The mediating role of emotional intelligence. *Discover Social Science and Health, 4*(1), Article 46. https://doi.org/10.1007/s44155-024-00110-3
23. Boyer, L., Millier, A., Perthame, E., Aballea, S., Auquier, P., & Toumi, M. (2013). Quality of life is predictive of relapse in schizophrenia. *BMC Psychiatry, 13*(1), Article 15. https://doi.org/10.1186/1471-244X-13-15
24. Shin, Y.-J., Joo, Y.-H., & Kim, J.-H. (2016). Self-perceived cognitive deficits and their relationship with internalized stigma and quality of life in patients with schizophrenia. *Neuropsychiatric Disease and Treatment, 12*, 1411–1417. https://doi.org/10.2147/NDT.S108537
25. Tang, I.-C., & Wu, H.-C. (2012). Quality of life and self-stigma in individuals with schizophrenia. *Psychiatric Quarterly, 83*(4), 497–507. https://doi.org/10.1007/s11126-012-9218-2

26. Cueli, M., Rodríguez, C., Cañamero, L., Núñez, J., & González-Castro, P. (2020). Self-concept and inattention or hyperactivity–impulsivity symptomatology: The role of anxiety. *Brain Sciences, 10*(4), Article 250. https://doi.org/10.3390/brainsci10040250
27. O'Neill, S., & Rudenstine, S. (2019). Inattention, emotion dysregulation and impairment among urban, diverse adults seeking psychological treatment. *Psychiatry Research, 282*, Article 112631. https://doi.org/10.1016/j.psychres.2019.112631
28. Peters, E. M., Balbuena, L., Baetz, M., Marwaha, S., & Bowen, R. (2015). Mood instability underlies the relationship between impulsivity and internalizing psychopathology. *Medical Hypotheses, 85*(4), 447–451. https://doi.org/10.1016/j.mehy.2015.06.026
29. Corrigan, P. W., & Watson, A. C. (2002). The paradox of self-stigma and mental illness. *Clinical Psychology: Science and Practice, 9*(1), 35–53. https://doi.org/10.1093/clipsy.9.1.35
30. Caqueo-Urízar, A., Ponce-Correa, F., Urzúa, A., Irarrázaval, M., Fond, G., & Boyer, L. (2022). Predictors of internalized stigma in patients with schizophrenia in Northern Chile: A longitudinal study. *Healthcare, 10*(11), Article 2269. https://doi.org/10.3390/healthcare10112269
31. Van Orden, K. A., Witte, T. K., Cukrowicz, K. C., Braithwaite, S., Selby, E. A., & Joiner, T. E. (2010). The interpersonal theory of suicide. *Psychological Review, 117*(2), 575–600. https://doi.org/10.1037/a0018697
32. Sadath, A., Kavalidou, K., McMahon, E., Malone, K., & McLoughlin, A. (2024). Associations between humiliation, shame, self-harm and suicidality among adolescents and young adults: A systematic review. *PLoS ONE, 19*(2), Article e0292691. https://doi.org/10.1371/journal.pone.0292691
33. Zhao, J., Chi, Y., Ju, Y., Liu, X., Wang, J., Liu, X., & Jia, C. (2020). Shame and suicidal ideation among undergraduates in China: The mediating effect of thwarted belongingness and perceived burdensomeness. *International Journal of Environmental Research and Public Health, 17*(7), Article 2360. https://doi.org/10.3390/ijerph17072360
34. Vrbova, K., Prasko, J., Ociskova, M., Holubova, M., Kantor, K., Kolek, A., & Slepecky, M. (2018). Suicidality, self-stigma, social anxiety and personality traits in stabilized schizophrenia patients—A cross-sectional study. *Neuropsychiatric Disease and Treatment, 14*, 1415–1424. https://doi.org/10.2147/NDT.S162070
35. Oexle, N., Rüsch, N., Viering, S., Wyss, C., Seifritz, E., Xu, Z., & Kawohl, W. (2017). Self-stigma and suicidality: A longitudinal study. *European Archives of Psychiatry and Clinical Neuroscience, 267*(4), 359–361. https://doi.org/10.1007/s00406-016-0698-1
36. Swanson, J. M., Schuck, S., Porter, M. M., Carlson, C., Hartman, C. A., Sergeant, J. A., & Wigal, T. (2012). Categorical and dimensional definitions and evaluations of symptoms of ADHD: History of the SNAP and the SWAN rating scales. *The International Journal of Educational and Psychological Assessment, 10*(1), 51–70.
37. Liu, Y. C., Liu, S. K., Shang, C. Y., Lin, C., Tu, C. L., & Gau, S.S.-F. (2006). Norm of the Chinese version of the Swanson, Nolan and Pelham, version IV scale for ADHD. *Taiwanese Journal of Psychiatry, 20*(4), 290–304.
38. Bussing, R., Fernandez, M., Harwood, M., Hou, W., Garvan, C. W., Eyberg, S. M., & Swanson, J. M. (2008). Parent and teacher SNAP-IV ratings of attention deficit hyperactivity disorder symptoms: Psychometric properties and normative ratings from a school district sample. *Assessment, 15*(3), 317–328. https://doi.org/10.1177/1073191107313888
39. Gau, S.S.-F., Lin, C.-H., Hu, F.-C., Shang, C.-Y., Swanson, J. M., Liu, Y.-C., & Liu, S.-K. (2009). Psychometric properties of the Chinese version of the Swanson, Nolan, and Pelham, Version IV scale-teacher form. *Journal of Pediatric Psychology, 34*(8), 850–861. https://doi.org/10.1093/jpepsy/jsn133
40. Gau, S. S., Shang, C., Liu, S., Lin, C., Swanson, J. M., Liu, Y., & Tu, C. (2008). Psychometric properties of the Chinese version of the Swanson, Nolan, and Pelham, version IV scale—parent form. *International Journal of Methods in Psychiatric Research, 17*(1), 35–44. https://doi.org/10.1002/mpr.237
41. Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*(3), 297–334. https://doi.org/10.1007/BF02310555
42. Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., & Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (M.I.N.I.): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry, 59*(20), 22–33.
43. Katz, C., Roos, L. E., Wang, Y., Bolton, J., Hwang, S. W., Katz, L. Y., & Chez, S. (2019). Predictive validity of the MINI suicidality subscale for suicide attempts in a homeless population with mental illness. *Suicide and Life-Threatening Behavior, 49*(6), 1630–1636. https://doi.org/10.1111/sltb.12544
44. Lecrubier, Y., Sheehan, D., Weiller, E., Amorim, P., Bonora, I., Harnett Sheehan, K., & Dunbar, G. (1997). The Mini International Neuropsychiatric Interview (MINI). A short diagnostic structured interview: Reliability and validity according to the CIDI. *European Psychiatry, 12*(5), 224–231. https://doi.org/10.1016/S0924-9338(97)83296-8
45. Fan, C.-W., Chang, K.-C., Lee, K.-Y., Yang, W.-C., Pakpour, A. H., Potenza, M. N., & Lin, C.-Y. (2022). Rasch modeling and differential item functioning of the Self-Stigma Scale-Short Version among people with three different psychiatric disorders. *International Journal of Environmental Research and Public Health, 19*(14), Article 8843. https://doi.org/10.3390/ijerph19148843
46. Chang, C.-C., Lin, C.-Y., Gronholm, P. C., & Wu, T.-H. (2018). Cross-validation of two commonly used self-stigma measures, Taiwan versions of the internalized Stigma Mental Illness Scale and Self-Stigma Scale–Short, for people with mental illness. *Assessment, 25*(6), 777–792. https://doi.org/10.1177/1073191116658547
47. Chan, Y., Chan, Y. Y., Cheng, S. L., Chow, M. Y., Tsang, Y. W., Lee, C., & Lin, C.-Y. (2017). Investigating quality of life and self-stigma in Hong Kong children with specific learning disabilities. *Research in Developmental Disabilities, 68*, 131–139. https://doi.org/10.1016/j.ridd.2017.07.014
48. Huang, P.-C., Hung, C.-H., Chen, G.-W., Cashin, C., Griffiths, M. D., Yang, W.-C., & Ko, N.-Y. (2022). COVID-19-related self-stigma, post-traumatic stress disorder, insomnia, and smartphone addiction among frontline government workers with COVID-19 pandemic control duties. *Psychology Research and Behavior Management, 15*, 3069–3080. https://doi.org/10.2147/PRBM.S383842
49. Mak, W. W. S., & Cheung, R. Y. M. (2010). Self-stigma among concealable minorities in Hong Kong: Conceptualization and unified measurement. *American Journal of Orthopsychiatry, 80*(2), 267–281. https://doi.org/10.1111/j.1939-0025.2010.01030.x
50. Wu, T.-H., Chang, C.-C., Chen, C.-Y., Wang, J.-D., & Lin, C.-Y. (2015). Further psychometric evaluation of the Self-Stigma Scale-Short: Measurement invariance across mental illness and gender. *PLoS ONE, 10*(2), Article e0117592. https://doi.org/10.1371/journal.pone.0117592
51. Lovibond, P. F., & Lovibond, S. H. (1995). *Manual for the Depression Anxiety Stress Scales*. Psychology Foundation of Australia.
52. Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the beck depression and anxiety

inventories. *Behaviour Research and Therapy, 33*(3), 335–343. https://doi.org/10.1016/0005-7967(94)00075-U
53. Wang, X., Cao, C.-H., Liao, X.-L., Jiang, X.-Y., Griffiths, M. D., Chen, I.-H., & Malas, O. (2025). Comparing the psychometric evidence of the Depression, Anxiety, and Stress Scale-21 (DASS-21) between Spanish and Chinese primary schoolteachers: Insights from classical test theory and Rasch analysis. *BMC Psychology, 13*(1), Article 450. https://doi.org/10.1186/s40359-025-02728-7
54. Adu, P., Popoola, T., Iqbal, N., Medvedev, O. N., & Simpson, C. R. (2025). Validating the Depression Anxiety Stress Scales (DASS-21) across Germany, Ghana, India, and New Zealand using Rasch methodology. *Journal of Affective Disorders, 383*, 363–373. https://doi.org/10.1016/j.jad.2025.04.099
55. Zhou, X., Shen, Z.-Z., Cao, C.-H., Liao, X.-L., Jiang, X.-Y., Griffiths, M. D., & Malas, O. (2024). Psychometric evaluation of DASS versions among Spanish and Chinese teachers using Exploratory Structural Equation Modeling (ESEM). *Acta Psychologica, 251*, Article 104626. https://doi.org/10.1016/j.actpsy.2024.104626
56. Chen, I.-H., Chen, C.-Y., Liao, X., Chen, X., Zheng, X., Tsai, Y.-C., & Pakpour, A. H. (2023). Psychometric properties of the Depression, Anxiety, and Stress Scale (DASS-21) among different Chinese populations: A cross-sectional and longitudinal analysis. *Acta Psychologica, 240*, Article 104042. https://doi.org/10.1016/j.actpsy.2023.104042
57. Cao, C., Liao, X., Gamble, J. H., Li, L., Jiang, X.-Y., Li, X.-D., & Lin, C.-Y. (2023). Evaluating the psychometric properties of the Chinese Depression Anxiety Stress Scale for Youth (DASS-Y) and DASS-21. *Child and Adolescent Psychiatry and Mental Health, 17*(1), Article 106. https://doi.org/10.1186/s13034-023-00655-2
58. Antony, M., Bieling, P., Cox, B., Enns, M., & Swinson, R. (1998). Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample. *Psychological Assessment, 10*(2), 176–181. https://doi.org/10.1037/1040-3590.10.2.176
59. Zanon, C., Brenner, R. E., Baptista, M. N., Vogel, D. L., Rubin, M., Al-Darmaki, F. R., & Zlati, A. (2021). Examining the dimensionality, reliability, and invariance of the Depression, Anxiety, and Stress Scale–21 (DASS-21) across eight countries. *Assessment, 28*(6), 1531–1544. https://doi.org/10.1177/1073191119887449
60. WHOQoL Group. (1998). Development of the World Health Organization WHOQOL-BREF quality of life assessment. *Psychological Medicine, 28*(3), 551–558. https://doi.org/10.1017/S0033291798006667
61. WHOQoL Group. (1993). Study protocol for the World Health Organization project to develop a quality of life assessment instrument (WHOQoL). *Quality of Life Research, 2*(2), 153–159. https://doi.org/10.1007/BF00435734
62. Yao, G., Chung, C.-W., Yu, C.-F., & Wang, J.-D. (2002). Development and verification of validity and reliability of the WHOQOL-BREF Taiwan version. *Journal of the Formosan Medical Association, 101*(5), 342–351.
63. Su, C.-T., Ng, H.-S., Yang, A.-L., & Lin, C.-Y. (2014). Psychometric evaluation of the short form 36 Health Survey (SF-36) and the World Health Organization Quality of Life Scale Brief Version (WHOQOL-BREF) for patients with schizophrenia. *Psychological Assessment, 26*(3), 980–989. https://doi.org/10.1037/a0036764
64. Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis*. Pearson.
65. Kline, R. B. (2023). *Principles and practice of structural equation modeling*. Guilford Press.
66. Cohen, J. (2013). *Statistical power analysis for the behavioral sciences* (2nd ed.). Routledge. https://doi.org/10.4324/9780203771587
67. Mardia, K. V. (1970). Measures of multivariate skewness and kurtosis with applications. *Biometrika, 57*(3), 519–530. https://doi.org/10.1093/biomet/57.3.519
68. Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software, 48*(2), 1–36. https://doi.org/10.18637/jss.v048.i02
69. Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, and Computers, 36*(4), 717–731. https://doi.org/10.3758/BF03206553
70. Boyle, M. P., & Fearon, A. N. (2018). Self-stigma and its associations with stress, physical health, and health care satisfaction in adults who stutter. *Journal of Fluency Disorders, 56*, 112–121. https://doi.org/10.1016/j.jfludis.2017.10.002
71. Chan, K. K. S., & Fung, W. T. W. (2019). The impact of experienced discrimination and self-stigma on sleep and health-related quality of life among individuals with mental disorders in Hong Kong. *Quality of Life Research, 28*(8), 2171–2182. https://doi.org/10.1007/s11136-019-02181-1
72. Hasan, A. A., & Musleh, M. (2018). Self-stigma by people diagnosed with schizophrenia, depression and anxiety: Cross-sectional survey design. *Perspectives in Psychiatric Care, 54*(2), 142–148. https://doi.org/10.1111/ppc.12213
73. Fan, Z., Shi, X., Lu, X., Zhang, J., & Li, L. (2025). Impact of self-stigma of loneliness on psychological distress in older adults: Mediation effect of relative deprivation and moderation effect of positive solitude. *BMC Geriatrics, 25*(1), Article 309. https://doi.org/10.1186/s12877-025-05904-x
74. Pattyn, E., Verhaeghe, M., Sercu, C., & Bracke, P. (2014). Public stigma and self-stigma: Differential association with attitudes toward formal and informal help seeking. *Psychiatric Services, 65*(2), 232–238. https://doi.org/10.1176/appi.ps.201200561
75. Corrigan, P. W., Nieweglowski, K., & Sayer, J. (2019). Self-stigma and the mediating impact of the "why try" effect on depression. *Journal of Community Psychology, 47*(3), 698–705. https://doi.org/10.1002/jcop.22144
76. Chang, K.-C., Lin, C.-Y., Chang, C.-C., Ting, S.-Y., Cheng, C.-M., & Wang, J.-D. (2019). Psychological distress mediated the effects of self-stigma on quality of life in opioid-dependent individuals: A cross-sectional study. *PLoS ONE, 14*(2), Article e0211033. https://doi.org/10.1371/journal.pone.0211033
77. Cheng, C.-M., Chang, C.-C., Wang, J.-D., Chang, K.-C., Ting, S.-Y., & Lin, C.-Y. (2019). Negative impacts of self-stigma on the quality of life of patients in methadone maintenance treatment: The mediated roles of psychological distress and social functioning. *International Journal of Environmental Research and Public Health, 16*(7), Article 1299. https://doi.org/10.3390/ijerph16071299
78. Liu, F., Deng, H., Hu, N., Huang, W., Wang, H., Liu, L., & Li, Y. (2024). The relationship between self-stigma and quality of life in long-term hospitalized patients with schizophrenia: A cross-sectional study. *Frontiers in Psychiatry, 15*, 1366030. https://doi.org/10.3389/fpsyt.2024.1366030
79. Huang, P.-H., Chi, M.-J., Kuo, C.-L., Wu, S.-F.V., & Chuang, Y.-H. (2021). Prevalence of loneliness and related factors among older adults in Taiwan: Evidence from a nationally representative survey. *INQUIRY: The Journal of Health Care Organization, Provision, and Financing*. https://doi.org/10.1177/00469580211035745
80. Huang, W.-Y., Chen, S.-P., Pakpour, A. H., & Lin, C.-Y. (2018). The mediation role of self-esteem for self-stigma on quality of life for people with schizophrenia: A retrospectively longitudinal

study. *Journal of Pacific Rim Psychology, 12*, Article e10. https://doi.org/10.1017/prp.2017.18
81. Świtaj, P., Grygiel, P., Chrostek, A., Nowak, I., Wciórka, J., & Anczewska, M. (2017). The relationship between internalized stigma and quality of life among people with mental illness: Are self-esteem and sense of coherence sequential mediators? *Quality of Life Research, 26*(9), 2471–2478. https://doi.org/10.1007/s11136-017-1596-3
82. Watters, C., Adamis, D., McNicholas, F., & Gavin, B. (2018). The impact of attention deficit hyperactivity disorder (ADHD) in adulthood: A qualitative study. *Irish Journal of Psychological Medicine, 35*(3), 173–179. https://doi.org/10.1017/ipm.2017.21
83. Corrigan, P. W., Larson, J. E., & Rüsch, N. (2009). Self-stigma and the "why try" effect: Impact on life goals and evidence-based practices. *World Psychiatry, 8*(2), 75–81. https://doi.org/10.1002/j.2051-5545.2009.tb00218.x
84. Chan, J. K. Y., & Leung, P. W. L. (2022). Common outcome, different pathways: Social information-processing deficits in autism spectrum disorder and attention-deficit/hyperactivity disorder. *World Journal of Psychiatry, 12*(2), 286–297. https://doi.org/10.5498/wjp.v12.i2.286
85. Hurtig, T. M., Taanila, A., Veijola, J., Ebeling, H., Mäki, P., Miettunen, J., & Moilanen, I. (2011). Associations between psychotic-like symptoms and inattention/hyperactivity symptoms. *Social Psychiatry and Psychiatric Epidemiology, 46*(1), 17–27. https://doi.org/10.1007/s00127-009-0165-7
86. Danckaerts, M., Sonuga-Barke, E. J. S., Banaschewski, T., Buitelaar, J., Döpfner, M., Hollis, C., & Coghill, D. (2010). The quality of life of children with attention deficit/hyperactivity disorder: A systematic review. *European Child & Adolescent Psychiatry, 19*(2), 83–105. https://doi.org/10.1007/s00787-009-0046-3
87. Adamis, D., West, S., Singh, J., Hanley, L., Coada, I., McCarthy, G., & McNicholas, F. (2024). Functional impairment and quality of life in newly diagnosed adults attending a tertiary ADHD clinic in Ireland. *Irish Journal of Medical Science, 193*(5), 2433–2441. https://doi.org/10.1007/s11845-024-03713-6
88. Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Harvard University Press.
89. Franklin, J. C., Ribeiro, J. D., Fox, K. R., Bentley, K. H., Kleiman, E. M., Huang, X., & Nock, M. K. (2017). Risk factors for suicidal thoughts and behaviors: A meta-analysis of 50 years of research. *Psychological Bulletin, 143*(2), 187–232. https://doi.org/10.1037/bul0000084
90. Joiner, T. E., Jr., Van Orden, K. A., Witte, T. K., Selby, E. A., Ribeiro, J. D., Lewis, R., & Rudd, M. D. (2009). Main predictions of the interpersonal–psychological theory of suicidal behavior: Empirical tests in two samples of young adults. *Journal of Abnormal Psychology, 118*(3), 634–646. https://doi.org/10.1037/a0016500
91. Langhinrichsen-Rohling, J., Snarr, J. D., Slep, A. M. S., & Heyman, R. E. (2019). Risk for suicide attempts among United States Air Force active duty members with suicide ideation: An ecological perspective. *Journal of Consulting and Clinical Psychology, 87*(12), 1124–1136. https://doi.org/10.1037/ccp0000435
92. Ariapooran, S., Heidari, S., Asgari, M., Ashtarian, H., & Khezeli, M. (2018). Individualism-collectivism, social support, resilience and suicidal ideation among women with the experience of the death of a young person. *International Journal of Community Based Nursing and Midwifery, 6*(3), 250–259.
93. Johnson, J., Gooding, P. A., Wood, A. M., & Tarrier, N. (2010). Resilience as positive coping appraisals: Testing the schematic appraisals model of suicide (SAMS). *Behaviour Research and Therapy, 48*(3), 179–186. https://doi.org/10.1016/j.brat.2009.10.007
94. Caqueo-Urízar, A., Urzúa, A., Habib, J., Loundou, A., Boucekine, M., Boyer, L., & Fond, G. (2020). Relationships between social stigma, stigma experience and self-stigma and impaired quality of life in schizophrenia across three Latin-American countries. *European Archives of Psychiatry and Clinical Neuroscience, 270*(5), 513–520. https://doi.org/10.1007/s00406-019-01035-8