

EMPIRICAL ARTICLE

Stigma toward internalizing and externalizing disorders: How do adolescents perceive their peers? A network analysis approach

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Abstract

This study's first aim was to explore whether stigma's facets differ between internalizing and externalizing disorders in adolescence. The second aim was to compare the relationships among stigma's facets toward these disorders. Two vignettes depicting a peer with Major Depressive Disorder (MDD) or Attention-Deficit Hyperactivity Disorder (ADHD) were used with 616 adolescents in Italy. A Repeated measure MANOVA showed biogenetic causes, social distancing, and discomfort were more attributed to depression, while dangerousness to ADHD. Furthermore, a Psychometric Network Analysis showed no differences between these disorders in the relations among stigma's components. However, dangerousness seemed to be among the nodes with the highest levels of "strength," confirming previous literature that shows that dangerousness plays a major role in stigma.

KEYWORDS

adolescence, mental disorders, stigma

INTRODUCTION

Stigma toward mental illness is a multifaceted construct characterized by several affective, behavioral, and cognitive processes that lead to prejudice and discrimination (Mannarini & Boffo, 2015; Mueller et al., 2012; Pescosolido et al., 2007). Stigma does not seem to have age limits: with high stigmatizing attitudes present both in adulthood and adolescence (Mannarini & Rossi, 2019; Mueller et al., 2012; O'Driscoll et al., 2015). The experience of adults and adolescents of public stigmatizing attitudes may negatively affect their treatment seeking, employment possibilities, self-efficacy, satisfaction with life, interactions with their peers, and consolidation of their own identity (Corrigan, 2000; Hinshaw, 2005; Mannarini & Boffo, 2015; Mannarini et al., 2018; Mannarini et al., 2021; O'Driscoll et al., 2015; Parcesepe & Cabassa, 2013; Rüsche et al., 2005; Yu et al., 2021). These attitudes could be internalized by those suffering from mental illness to the point of believing that they are less valuable and of stigmatizing themselves (i.e., *self-stigma*) (Rüsche et al., 2005; Yu et al., 2021).

Regarding the adult population, people with substance addiction, schizophrenia, and ADHD seem to be more likely to be socially rejected than people with anxiety, depression, or bulimia (Mannarini & Boffo, 2015; Mueller et al., 2012; Schomerus et al., 2011). Social rejection seems to be ascribed to the perception of these disorders as dangerous and to the belief that they are not treatable (Coleman et al., 2009; Mueller et al., 2012; Parcesepe & Cabassa, 2013; Sideli et al., 2021). In this regard, the general population seems to perceive as most dangerous the following disorders: schizophrenia (Mannarini et al., 2022; Mannarini & Boffo, 2015), alcohol dependence (Schomerus et al., 2011) and ADHD (Lebowitz, 2016; Mueller et al., 2012). Various factors can contribute to this negative perception, including a sense of uncertainty about these mental illnesses (Schomerus et al., 2011), expectation of external negative behaviors by people affected by them (Mueller et al., 2012) and believing they have a biogenetic etiology (Corrigan et al., 2003; Read et al., 2006; Schnyder et al., 2018; Yoshioka et al., 2016). However, in relation to the latest factor, the biological causal belief is still the most widely shared by the general

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population for schizophrenia (Mannarini & Boffo, 2015; Read et al., 2006; Sideli et al., 2021). Furthermore, the most suggested treatment for schizophrenia is medical (Mannarini & Boffo, 2015; Read et al., 2006). On the contrary, the general population identifies psychological causes and psychological treatment as the most suitable for anxiety, bulimia, and depression (Mannarini & Boffo, 2015; Mannarini, Boffo, & Balottin, 2013). In the end, the general population considers the combination of biopsychosocial and genetic chemistry causes and psychotherapeutic treatment to be one of the most suitable for ADHD (Speerforck et al., 2021).

As previously stated, stigma toward mental disorders does not spare even the youngest ones (DuPont-Reyes et al., 2020; Elkington et al., 2011; Moses, 2010; Mueller et al., 2012; Painter et al., 2017; Wahl et al., 2012). As a matter of fact, adolescents with ADHD or depression tend to be excluded from their peers due to the stigma attached to their mental disorders (Dolphin & Hennessy, 2014; Mueller et al., 2012; O'Driscoll et al., 2015; Walker et al., 2008). Specifically, O'Driscoll et al. (2015) conducted a qualitative study to investigate the reasons why adolescents exclude their peers with mental health problems. Although previous contact with peers with mental disorders was not taken into account by the authors, their results show that the respondents believed that peers with ADHD would harm their social reputation and affect group rules and cohesion. In addition, respondents reported they feared to be infected by peers with depression with low mood—*emotional contagion* (O'Driscoll et al., 2015). Consequently, adolescents with these disorders are looked at suspiciously by their peers and perceived as dangerous (Walker et al., 2008). Considering causal beliefs of these disorders, the literature shows that parenting, substance abuse, and believing that individuals with mental illness are putting low effort to overcome their suffering are believed to be causal explanations for both ADHD and depression in adolescence (Coleman et al., 2009). Stigma toward mental disorders can have negative consequences when experienced in adolescence, since this developmental period represents a critical moment for the consolidation of one's identity and for the acquisition of autonomy (Hinshaw, 2005). Consequently, stigma could negatively affect one's self-image, self-esteem, and independence (Hinshaw, 2005; Mannarini, 2010; Mannarini & Boffo, 2014b). Taking this literature into account, it emerges the importance of investigating stigma toward peers with specific reference to internalizing and externalizing disorders. Another reason why it is important to expand our understanding of this matter is shown by epidemiological data in adolescence: ADHD (Bianchini et al., 2013) and depression (Poli et al., 2003) are highly frequent in this age group in the Italian population (Bianchini et al., 2013; O'Driscoll et al., 2012; O'Driscoll et al., 2015; Poli et al., 2003; Walker et al., 2008). Furthermore, as described above, adolescents with ADHD or depression may be at high risk of being stigmatized and social isolated by their peers. However, stigma in adolescence seems to be little researched (Corrigan et al., 2005; DeLuca, 2020; Silke et al., 2016; Swords et al., 2011).

The purpose of this study was to investigate whether stigma's facets differ between internalizing and externalizing disorders and to compare, using a quantitative approach (i.e., network analysis approach), the relationships between the stigma's facets toward these disorders among a large sample of adolescents recruited from several high schools in Italy. To reach this objective, the methodology of vignettes representing a peer suffering from depression (internalizing disorder) and one from ADHD (externalizing disorder) was selected. For each vignette, four facets of public stigma (causal beliefs, treatments, social distance, and perception of dangerousness) have been investigated, as well as two facets related to the self-stigma (perception of discomfort and social isolation) of the protagonist as perceived by the respondents. Moreover, specifically concerning the network approach, this has been chosen because it best suited the objective of our work. Indeed, it allows to investigate the relationships among variables and the strength of these relations (Dalege et al., 2017). Moreover, it allows to identify the core facet of stigma that could be target of anti-stigma interventions. Indeed, understanding the relationships among the stigma's facets and which of them may play a major role in stigmatizing attitudes can help develop targeted interventions. In the end, to the best of our knowledge, no other studies have been found using network analysis with the aim of investigating stigma with the adolescent population. Therefore, the network analysis represents an innovative method to investigate the relationships among the stigma's facets at a manifest level.

METHODS

Sample size determination

The sample size was planned a priori considering the main statistical analyses of this study—namely, psychometric network analysis, (see dedicated section). However, to date, there seems to be no “gold standard” rule for determining the minimum sample size required—thus, in line with recent literature, a “person: parameter ratio” rule-of-thumb was used (Epskamp, 2017; Epskamp et al., 2018; Fried & Cramer, 2017).

$$N_{\text{minimum}} = a * \left[N_{\text{thresholds}} + \left(N_{\text{nodes}} * \frac{N_{\text{nodes}} - 1}{2} \right) \right]$$

Where N_{minimum} is the minimum sample size required to correctly estimate parameters of the network model, $N_{\text{thresholds}}$ is the number of thresholds parameters of the nodes of the network, N_{nodes} is the number of nodes (variables/items) considered in the exploratory analysis, and a is the number of subjects designated *per* parameter. In a 6-node network (6 variables considered) there are 21 parameters (6 thresholds parameter *plus* 6*5/2 pairwise association parameters) (Epskamp, 2017; Epskamp et al., 2018; Fried & Cramer, 2017). Consequently, considering 10 subjects per

parameter, a minimum of 210 participants *per* group was guaranteed.

Procedure

Inclusion criteria for the participants in the study were as follows: (A) being a native Italian speaker; (B) being at least “early adolescent” (i.e., 12 y.o.); and (C) parents and/or legal caregivers provided informed consent prior to the inclusion in the study. Exclusion criteria were as follows: (D) did not answer all the questions in the survey.

Participants were recruited by contacting the head teacher of several high schools. The administration of the vignettes took place in classrooms during school hours, and teachers were not present to ensure anonymity and decrease the risk of social desirability biases. Participants did not receive any remuneration or incentives. The study was in accordance with the ethical standards of the Declaration of Helsinki and it was approved by the Ethical Committee of the University of Padua, Italy (n° = 3178).

In order to have a heterogeneous sample and as generalizable as possible, the following procedure was implemented: (1) three different Italian regions were randomly decided; (2) then, within the decided regions, several schools were contacted; (3) on the basis of positive feedback from schools to participate in the study, three different high schools were enrolled—being careful not to recruit high schools of the same type. Moreover, in order not to recruit subjects with inflated elevated social class, only public schools have been contacted—which provides a good representation of students in the Italian school system because they contain individuals of different social classes.

The administration of the vignettes and measures developed ad hoc (see dedicated section) was carried out in three different Italian regions: Lombardia ($n = 213$; 34.6%); Umbria ($n = 189$; 30.7%), and Veneto ($n = 214$; 34.7%). Moreover, within each region, three different types of high schools were contacted: professional institute ($n = 149$; 24.2%), technical institute ($n = 287$; 46.6%), high school for scientific studies ($n = 180$; 29.2%). Moreover, to avoid possible effects related to the order of presentation of the vignettes, these have been counterbalanced: (A) 1st internalizing-2nd externalizing: $n = 316$ (51.3%); (B) 1st externalizing-2nd internalizing: $n = 300$ (48.7%)—as well as the sex of the protagonist of the vignette: (C) male: $n = 301$ (48.9%); (D) female: $n = 315$ (51.1%). Finally, the administration of the questionnaires was randomized between subjects, within each class.

Participants

An initial sample of 643 participants was contacted. However, 27 of them were excluded from the final sample due to missing data/answers. Descriptive statistics of this “subsample”

are reported in the supplementary material. Thus, no missing data were retained into the final sample.

The final sample was composed by 616 participants [292 males (47.4%) and 324 females (52.6%), aged from 12 to 20 years ($mean = 14.96$, $SD = 2.116$)]. More in detail, most of the participants (592; 84.3%) were aged between 13 y.o. and 18y.o., 74 participants (12%) were 12 y.o., 15 participants (2.4%) were 19 y.o., and 8 participants (1.3%) were 20 y.o. Descriptive statistics are reported in [Table 1](#).

Measures

Biographic information form

An assessment of general information was done, including age, and sex. Moreover, also previous experience with people with internalizing/externalizing disorders using the following question at the end of each vignette: “Have you ever had experiences with people who have experienced or are experiencing the condition described in the vignette?”. Descriptive statistics are reported in [Table 1](#).

Vignettes

In line with previous studies (e.g., Mannarini et al., 2020), a vignette approach was used to investigate the main facets of stigma toward individuals with internalizing/externalizing disorders. Developed according to DSM-5 diagnostic criteria (American Psychiatric Association, 2013), vignettes reported a brief description of an individual who presents the most common problems and symptoms of an internalizing or externalizing disorders (M.C. Angermeyer & Matschinger, 2005; A.F. Jorm et al., 2006; Mannarini & Rossi, 2019). In particular, MDD was chosen as an internalizing disorder, while ADHD as an externalizing one.

Participants were asked to evaluate: (1) possible cause of mental disorders of the protagonist, (2) possible treatments to cure his/her problems, (3) the desire for social distance from that person, (4) the degree of social dangerousness of the described person, (5) the perceived discomfort, and (6) the desire of people to avoid that person (Mannarini & Rossi, 2019).

Causal beliefs

Participants indicated their agreement on 10 possible etiologies of the mental disorder of the protagonist of the vignette. Specifically, five items were related to psychosocial causes of mental disorders, and the other five items referred to biogenetic causes. Higher scores indicated a greater tendency to attribute etiology to biogenetic factors. Cronbach's alpha for MDD was 0.61 and Cronbach's alpha for ADHD was 0.64.

TABLE 1 Sample descriptive statistics

	Overall (N = 616)		Male (n = 292)		Female (n = 324)		Statistic	p-value	Effect size
	Mean	SD	Mean	SD	Mean	SD			
Age	14.96	2.116	15.10	2.214	14.84	2.019	$t = 1.498$	$p = .135$	$d = -0.123$
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%			
Sex of the vignette							$\chi^2 = 0.287$	$p = .592$	OR = 1
Male	301	48.9	146	50	155	47.8			
Female	315	51.1	146	50	169	52.2			
Experience of the externalizing disorder							$\chi^2 = 0.153$	$p = .696$	OR = 0.940
Yes	311	50.5	145	49.7	166	51.2			
No	305	49.5	147	50.3	158	48.8			
Experience of the internalizing disorder							$\chi^2 = 1.689$	$p = .194$	OR = 0.811
Yes	306	49.7	137	46.9	169	52.2			
No	310	50.3	155	53.1	155	47.8			
Vignette exposure							$\chi^2 = 0.084$	$p = .772$	OR = 1.049
1st externalizing disorder-2nd internalizing disorder	300	48.7	144	49.3	156	48.1			
1st internalizing disorder -2nd externalizing disorder	316	51.3	148	50.7	168	51.9			

Note: t = t-test; d = Cohen's; χ^2 = chi-square statistic; OR = odds ratio.

Treatments

Participants were asked to express their agreement on seven possible treatment approaches to address the problems of the vignette's protagonists. More in detail, four items referred to psychotherapeutic approaches and three items referred to medical/pharmacological treatments. Higher scores indicated a higher tendency to recommend medical treatments. Cronbach's alpha for MDD was 0.64 and Cronbach's alpha for ADHD was 0.68.

Social distance

The desire for social distance from the protagonist of the vignettes with either an internalizing or an externalizing disorder was evaluated with seven items that investigated the respondents' preference not to be personally involved with the person described. Cronbach's alpha for MDD was 0.82 and Cronbach's alpha for ADHD was 0.82.

Perception of dangerousness

The perceived dangerousness of the person described in the vignette was evaluated with five items related to the possibility that the protagonist exhibits violent, uncontrolled, or dangerous behavior toward others. Cronbach's alpha for MDD was 0.72 and Cronbach's alpha for ADHD was 0.8.

Perception of discomfort

The respondents were also asked, through three items, to place themselves in the role of the protagonists of the vignettes and to determine how much discomfort these protagonists could feel in their circumstances. Cronbach's alpha for MDD was 0.74 and Cronbach's alpha for ADHD was 0.79.

Social isolation

Additionally, three items were used to examine the point of view of the protagonists of the vignette by asking respondents to evaluate the perception of social isolation that could be experienced by the individuals described. Cronbach's alpha for MDD was 0.60 and Cronbach's alpha for ADHD was 0.65.

Statistical analyses

The R software (R Core Team, 2014, 2017) was used with the following packages: *bootnet* (Epskamp et al., 2018), *corrplot* (Wei & Simko, 2017), *ICC* (Wolak et al., 2012), *igraph* (Csardi & Nepusz, 2006), *mgm* (Haslbeck & Waldorp, 2020), *NetworkComparisonTest* (van Borkulo et al., 2017), *networkTools* (Jones, 2020), *qgraph* (Epskamp et al., 2012), *psych* (Revelle, 2018), and *psychTools* (Revelle, 2020).

Preliminary analyses were performed before carrying out the statistical analyses. Potential effects of data clustering (multilevel/hierarchical) were assessed (Heck & Thomas, 2015; Hedges et al., 2012; Hox et al., 2018; Pietrabissa et al., 2020). Given the nested nature of the data (1st level: subjects; 2nd level: class; 3rd level: school; 4th level: Italian region), the intraclass correlation coefficient (ICC) was computed for each scale—using Maximum Likelihood (ML) estimation. An ICC higher than 0.050 was assumed as evidence of the clustering effect (Hayes, 2006; Heck, 2001; Thomas et al., 2005). In addition, the design effect (DEFF) was also computed. In this case, a DEFF higher than 2 was assumed as evidence of clustering effect (Lai & Kwok, 2015; Maas & Hox, 2005; Muthén & Satorra, 1995; Peugh, 2010). Then, excessive bivariate correlations ($r \geq 0.60$) between items were inspected (Howell, 2013; Tabachnick & Fidell, 2014).

Subsequently, to examine whether facets of stigma differ between internalizing and externalizing disorders, a paired sample multivariate analysis of variance (repeated-measure MANOVA) was performed. Bonferroni correction was applied. Overall mean comparison was evaluated with η_p^2 and pairwise mean comparisons were interpreted with corrected Cohen's d for paired data. The aforementioned effect sizes were interpreted using the following benchmarks (Cohen, 1988): null ($\eta_p^2 < 0.10$; $d < 0.20$), small (η_p^2 from 0.10 to 0.059; d from 0.20 to 0.49); moderate (η_p^2 from 0.060 to 0.139; d from 0.50 to 0.79); and large ($\eta_p^2 > 0.140$; $d > 0.80$).

Preliminary analyses were performed before carrying out the network analysis. First, for each scale, the level of informativeness was evaluated (Mullarkey et al., 2019). An item should be considered poorly informative if its SD is 2.5SDs below the average of all the items' SDs (Marchetti, 2019; Mullarkey et al., 2018; Mullarkey et al., 2019). Second, possible scale redundancy was checked. Two items of a psychometric network were considered as “redundant” if they shared more than 75% of statistically equal correlations with all the other items in the network—thus, a redundancy index below 0.25 suggests possible items' redundancy (Jones, 2020).

Lastly, a psychometric network analysis (PNA) was performed to assess relationships between variables. To examine whether facets of stigma interrelate differently between internalizing and externalizing disorders, a psychometric network analysis approach was used (Costantini et al., 2015; Costantini & Perugini, 2016; Epskamp, 2017). More specifically, sex- and age regression-based corrected scale scores were used to estimate regularized partial correlation network models (Fritz et al., 2019; Santos et al., 2018). Moreover, the GLASSO method with polychoric correlations was used to estimate model parameters (Costantini et al., 2015; Epskamp, 2017; Golino & Epskamp, 2017). Then, PNA was computed separately for internalized and externalized disorders. Using the procedure of Fritz et al. (2019), these networks—containing the six aforementioned facets of stigma—were corrected for the variable “having had knowledge (or not) of a person with the disorder described in the vignette.”

The local properties of the network were investigated. In particular, stability of each network model was assessed

independently (Epskamp et al., 2018): the correlation stability coefficient (CS-coefficient) was used. CS-coefficient values higher or equal to 0.5 indicates optimal stability and values higher than 0.25 indicate moderate stability (Epskamp et al., 2018; Fried et al., 2018; Marchetti, 2019).

Also, centrality indices were computed to investigate four different measures of nodes centrality: (1) strength (i.e., the number of edges (relationships) connected with a node); (2) expected influence (i.e., the amount of variance of a node/item is explained by the edges connected to that specific node/item); (3) betweenness (i.e., the interactions between nodes/items depending on the other nodes which lie on the same path); and (4) closeness (i.e., how close one node/item is to all the other nodes/items based on the shortest) (Dalege et al., 2017; Haslbeck & Waldorp, 2018, 2020; McNally et al., 2017).

Lastly, to compare whether the two networks (i.e., internalizing vs. externalizing) differed from each other in their structures, a two-tailed paired sample permutation test (i.e., “network comparison tests” (NCTs)) was used (Elliott et al., 2020; Fritz et al., 2018; van Borkulo et al., 2017; Santos et al., 2018).

RESULTS

Preliminary analyses

As reported in Table 2, only the “sense of dangerousness” scale revealed an ICC (0.067) and a DEFF (2.202) slightly higher than the recommended thresholds—showing that five of 12 scales had no clustering effect of the class (2nd level) nor of the school (3rd level) nor the Italian region (4th level). Thus, considering these results, non-multilevel statistics were further run. Given the low power related to levels 3 (school) and 4 (regions), the ICC values shown in Table 2 refer to the second clustering level (class).

Moreover, an inspection of bivariate relationships (Pearson's bivariate correlation coefficients) revealed the absence of excessive linear associations: all coefficients were below $|0.60|$.

Difference among facets of stigma: Internalizing versus externalizing disorders

Repeated-measure MANOVA showed a statistically significant multivariate effect: Wilks's $\Lambda = 0.030$, $F = 1761.148$, with $p < .001$, $\eta_p^2 = 0.970$. Moreover, repeated-measure MANOVA revealed statistically significant within subject effect: $F = 2286.033$, $p < .001$, and $\eta_p^2 = 0.788$ (Greenhouse-Geisser correction).

As reported in Table 3, paired post hoc univariate-focused contrasts (Bonferroni correction) were performed to assess differences between (A) scales concerning internalizing disorders and (B) the corresponding scale concerning externalizing disorders. More in detail, a statistically significant difference within the “causal beliefs” scale: $t = -4.013$, $p_{\text{bonf}} = 0.004$, $d = -0.213$. Moreover, a statistically significant

TABLE 2 Intraclass correlation coefficient, design effect, and correlation between facets of stigma for both internalizing and externalizing disorders

		Internalizing		Externalizing		Correlations					
		ICC	DEFF	ICC	DEFF	(1)	(2)	(3)	(4)	(5)	(6)
(1)	Causal beliefs	0.021	1.380	0.044	1.796		0.369***	0.108**	0.277***	0.288**	-0.125**
(2)	Treatments	0.036	1.652	0.006	1.100	0.394***		0.076§	0.231***	0.094*	-0.032§
(3)	Social distance	0.047	1.854	0.048	1.863	0.026§	-0.010§		-0.115**	0.205**	0.267**
(4)	Dangerousness	0.067	2.202	0.014	1.258	0.413***	0.353***	-0.213***		0.233**	-0.237**
(5)	Discomfort	0.016	1.280	0.029	1.529	0.344***	0.159***	0.109**	0.248***		-0.211**
(6)	Social isolation	0.036	1.643	0.016	1.287	-0.159***	-0.130**	0.361***	-0.292***	-0.141***	

Note: above the main diagonal are reported correlations for internalizing disorders; whereas, below the diagonal are reported correlations for externalizing disorders.

* $p < .050$; ** $p < .010$; *** $p < .001$; § $p > .050$ ns; ICC = intraclass correlation coefficient, DEFF = design effect.

TABLE 3 Repeated-measures MANOVA: paired comparison with post hoc test

	Internalizing		Externalizing		Post hoc paired <i>t</i> -test	Bonf-adj <i>p</i> -value	Paired <i>d</i>
	Mean	SD	Mean	SD			
Causal beliefs	23.63	4.186	22.91	4.405	-4.013	.004	-0.213
Treatments	16.15	3.502	16.09	3.708	-0.334	1.000	-0.018
Social distance	22.58	3.969	20.97	4.298	-8.947	<.001	-0.475
Dangerousness	11.75	3.020	12.55	3.447	4.446	<.001	0.236
Discomfort	9.36	2.236	8.36	2.423	-5.547	<.001	-0.295
Social isolation	8.63	2.058	8.53	2.094	-0.550	1.000	-0.029

Note: CSB = causal beliefs; TRT = treatments; SCD = social distance; DNG = (sense of) dangerousness; DSC = discomfort; SCI = social isolation.

difference was not found within the “treatments” scale: $t = -0.334$, $p_{\text{bonf}} = 1.000$ ns, $d = -0.018$. A statistically significant difference was found within the “social distance” scale: $t = -8.947$, $p_{\text{bonf}} < 0.001$, $d = -0.475$. A statistically significant difference was found within the “sense of dangerousness” scale: $t = 4.446$, $p_{\text{bonf}} < 0.001$, $d = 0.236$. Furthermore, a statistically significant difference was found within the “sense of discomfort” scale: $t = -5.547$, $p_{\text{bonf}} < 0.001$, $d = -0.295$. Lastly, a statistically significant difference was not found within the “social isolation” scale: $t = -0.550$, $p_{\text{bonf}} = 1.000$ ns, $d = -0.029$.

Network structure

Preliminary analysis

The level of informativeness and the redundancy of each scale were evaluated. None of the scales was found to be poorly informative (i.e., 2.5 SD below the mean) nor potentially redundant. Thus, all of the scales were retained and used to perform the psychometric network analysis.

Psychometric Network analysis

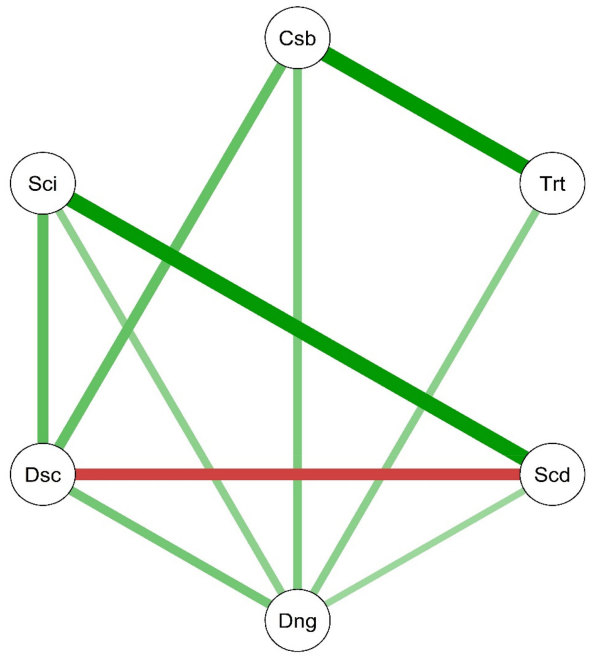
Stigma toward internalizing disorder

Considering the facets of stigma toward internalizing disorder, the network model estimated with the GLASSO

algorithm showed several moderate statistically significant positive relationships between facets of stigma as well as a negative one. The heaviest edge was between “causal beliefs” of mental disorders and “treatments” for mental disorder (0.316). The second thickest edge was between “social distance” from the individual with mental illness and the “social isolation” of that individual (0.312). Lastly, the third heaviest edge was the negative relationship between “social distance” and “discomfort” (-0.234). Results are reported in Figure 1 and Table 4. These three edges thus appear to be the strongest ones, thus highlighting how this variable is closely related to each other (returns a stronger association) controlling for all other variables in the network.

Stability analyses indicated that the network model had moderate stability: CS-coefficient = 0.286. Centrality indices revealed that “discomfort” and “dangerousness” had the highest node “strength” while “treatments” had the lowest. The highest “expected influence” was shown by “social isolation” and “dangerousness,” while “social distance” had the lowest. The highest “betweenness” was shown by “discomfort” and “causal beliefs,” while “social distance,” “treatments,” and “dangerousness” had the lowest. Lastly, the highest “closeness” was shown by “discomfort” and “dangerousness,” while “treatments” had the lowest. These results suggest that “discomfort” and “dangerousness” have the greatest number of relationships (strength) and influence (expected influence) on the other network variables regarding stigma toward individuals with internalizing

GLASSO network, Stigma toward internalizing mental illness



GLASSO network, Stigma toward externalizing mental illness

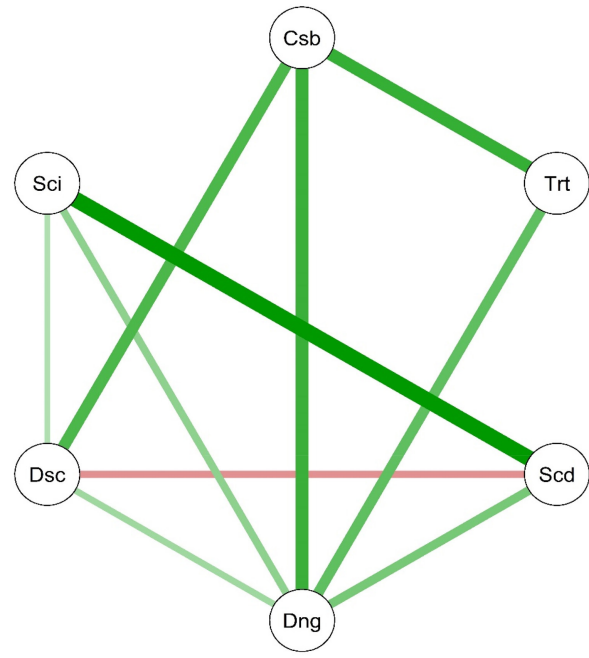


FIGURE 1 Network models for facets of stigma towards internalizing and externalizing mental illness – adjusted for sex, age, and previous experiences with mental illness.

TABLE 4 Weight matrix for the both GLASSO network models: internalizing and externalizing

	Internalizing					
	CBS	TRT	SCD	DNG	DSC	SCI
CBS						
TRT	0.316					
SCD	—					
DNG	0.163	0.144	0.123			
DSC	0.192	—	-0.234	0.173		
SCI	—	—	0.312	0.142	0.205	
	Externalizing					
	CBS	TRT	SCD	DNG	DSC	SCI
CBS						
TRT	0.271					
SCD	—	—				
DNG	0.265	0.214	0.184			
DSC	0.240	—	-0.150	0.128		
SCI	—	—	0.343	0.151	0.106	

Abbreviations: CSB, causal beliefs; DNG, (sense of) dangerousness; DSC, discomfort; SCD, Social distance; SCI, Social isolation; TRT, treatments.

disorders—thus showing a key and fundamental role. Results are reported in Figure 2.

Stigma toward externalizing disorder

Considering the facets of stigma toward externalizing disorder, also, in this case, the network model estimated with

GLASSO algorithm showed several moderate statistically significant positive relationships between these facets as well as a negative one. The heaviest edge was between “social distance” from the individual with mental illness and the “social isolation” of that individual (0.343). The second thickest edge was between “causal beliefs” and “treatments” for mental disorder (0.271). Lastly, the third heaviest edge was between “causal beliefs” of mental disorders and (perceived) “dangerousness” of individuals with mental illness (0.265). Results are reported in Figure 1 and Table 4. Also in this case, these three edges thus appear to be the strongest ones, highlighting how this variable is closely related to each other (returns a stronger association) controlling for all other variables in the network.

Stability analyses indicated that the network model had quite-moderate stability: CS-coefficient = 0.21. Centrality indices revealed that “dangerousness” and “causal beliefs” had the highest node “strength,” while “treatments” had the lowest. The highest “expected influence” was shown by “dangerousness,” while “social distance” and “discomfort” had the lowest. The highest “betweenness” was shown by “dangerousness,” while “social distance,” “treatments,” and “discomfort” had the lowest. Lastly, the highest “closeness” was shown by “dangerousness” while “social isolation” had the lowest. Also in this case, these results suggest that “discomfort” and “dangerousness” have the greatest number of relationships (strength) and influence (expected influence) on the other network variables—thus showing a central role—regarding stigma also toward individuals with externalizing disorders. Results are reported in Figure 2.

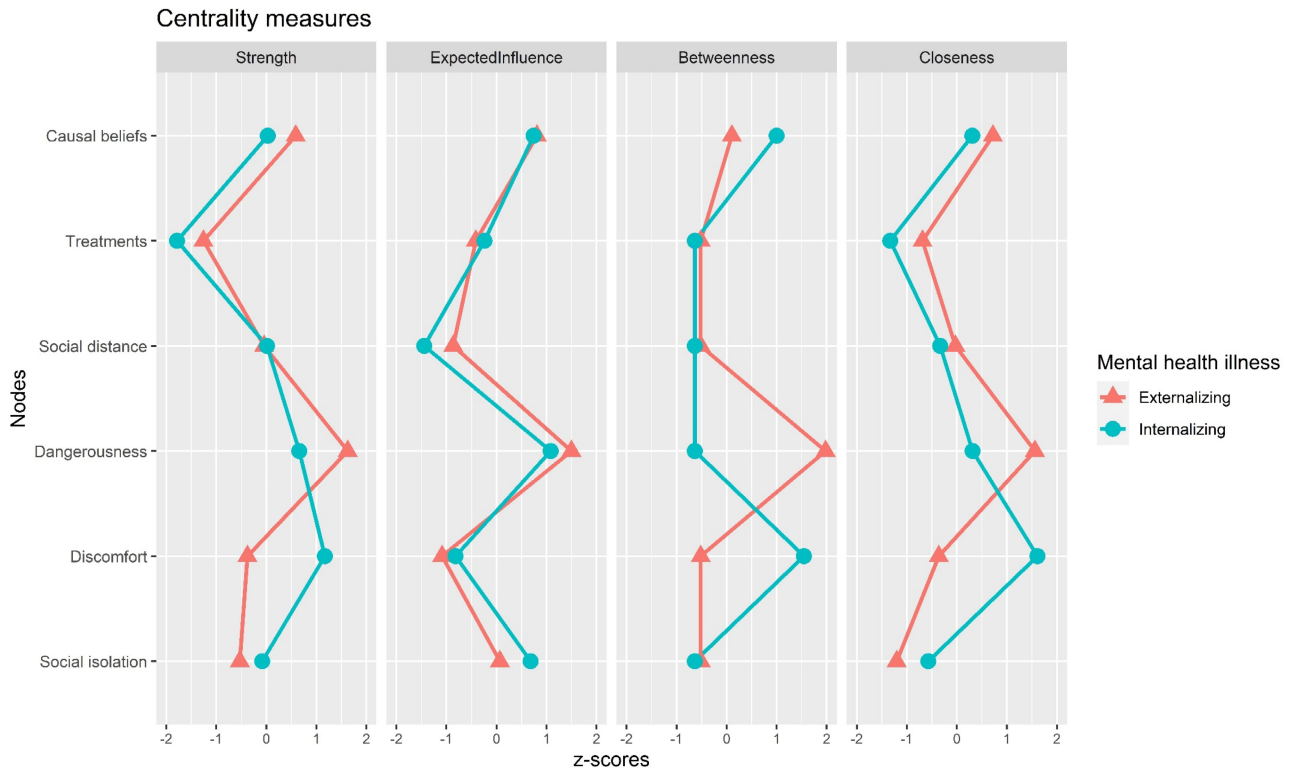


FIGURE 2 Strength, closeness and betweenness of the two network analyses.

Network comparison

The NCT showed that the two network structures were invariant ($M = 0.105$, $p = .515$) with a similar global strength—internalizing (1.989) versus externalizing (2.253)— $S = 0.263$, $p = .451$. Moreover, as reported in Table S1 (Suppl. Material), the NCT showed that the network structure of facets of stigma for internalizing disorder was not different from the network structure of facets of stigma for externalizing disorder.

Consequently, the facets of stigma toward mental illness had the same relationships—moreover, these relationships had (almost) the same strength between ADHD and depression.

DISCUSSION

Stigmatization of mental disorders has been increasingly perceived as a major issue in the mental health area (Mannarini et al., 2017; Mannarini et al., 2018). However, the phenomenon of stigma in adolescence has not yet been fully analyzed and understood (Swords et al., 2011; Walker et al., 2008). Consequently, to broaden our understanding of this topic, a repeated measure MANOVA and a Psychometric Network Analysis have been conducted to examine whether stigma's facets differ between internalizing and externalizing disorders and to compare the relationships among these facets toward an externalizing disorder (ADHD) and an internalizing one (depression) in the adolescent population.

Despite the fact that the MANOVA results present low Cohen's d , biogenetic causes seemed to be significantly more attributed to depression compared to ADHD. In addition, social distancing and discomfort appeared to also be significantly more attributed to internalizing disorder. This result can be interpreted from the perspective of emotional contagion: students may fear being infected by the depression of their peers and, consequently, isolate them (O'Driscoll et al., 2015). However, ADHD has been significantly more perceived as dangerous compared to depression. According to the literature, this perception appears to be related to externalizing behaviors of ADHD patients (Mueller et al., 2012) which may lead to considering these peers as potential threats to others. Adolescents' perception of dangerousness of individuals with ADHD seems to mirror the results of the adult population (Lebowitz, 2016; Mueller et al., 2012). Consequently, it may be possible that this facet of stigma may not change over time.

Despite the differences in adolescents' perception of the two mental disorders that resulted in the MANOVA outcome, the network analysis showed two interesting results. First, no differences emerged in terms of the relations among stigma's facets between externalizing and internalizing disorders. In other words, the relationships among the components of stigma seem to be the same when comparing adolescents' perception of an externalizing disorder (ADHD) and of an internalizing one (depression). In this regard, one of the thickest edges for both disorders was between “causal beliefs” and “treatments” for mental disorders. This result for the adolescent population seems to confirm what is already present

in the literature for adults: that etiological beliefs about mental illness in the general population seem to correlate with treatment beliefs (Mannarini & Boffo, 2015; Mannarini & Rossi, 2019; Midgley et al., 2017; Perry et al., 2007; Read et al., 2006; Speerforck et al., 2021; Spitzer & Cameron, 1995). Thus, for example, Mannarini et al. (2020) investigated differences and similarities in causal beliefs and treatments for schizophrenia disorder among four group categories (mental health professional, relative, patient, and student). Based on the results, these groups tended to suggest a treatment for a person with schizophrenia that matched their causal beliefs about this mental disorder. Consequently, participants considered medical treatments appropriate when schizophrenia was considered to have a biogenetic etiology. Similar results between adult and adolescent populations seemed to be made for the edge between “dangerousness” and “causal beliefs” (Corrigan et al., 2003; Read et al., 2006; Schnyder et al., 2018; Yoshioka et al., 2016) which appear to be among the strongest edges for externalizing disorders. In this regard, causal beliefs on mental disorders seem to affect the perception of dangerousness of people with these disorders (Jorm et al., 2012; Kaushik et al., 2016). For example, Yoshioka et al. (2016) showed that the identification of personality characteristics and genetic conditions as the causes of depression and schizophrenia in adulthood was related to a stronger perception of these individuals as dangerous and unpredictable. Another high edge for both ADHD and depression was between the “social distance” from the protagonist of the vignettes and the “social isolation.” Interestingly, this seems to confirm that public stigma and self-stigma are interconnected (Corrigan, 2004): the social distance that a respondent would put toward the vignette protagonist is associated with the social isolation that a respondent believes the person affected by mental illness actually experiences. A third thick edge that emerged for the internalizing disorder was the negative relationship between “social distance” and “discomfort.” In other words, as adolescents become aware of the discomfort of their peers and may feel uncomfortable about their condition, the more the social distance seems to decrease. This result may reflect that the discomfort items require a shift into the point of view of the protagonist of the vignette. As a result of this change in perspective, the protagonist of the vignette may be less stigmatized by the respondents.

The second interesting result of network analysis is that the perception of dangerousness seems to represent a core facet of stigma for both ADHD and depression. This means that dangerousness may be important both in developing and maintaining stigma for both disorders. Consequently, it should be the main target of anti-stigma intervention with the adolescent population to directly or indirectly affect the other nodes of the stigma network (Levinson et al., 2018). Furthermore, the results of this study show that treatments seem to play a minor role compared to the perception of dangerousness in the concept of stigma.

This study presents some limitations. First, social desirability measures were not included. Second, this study was

conducted in Italy. As previously shown in the literature (Mannarini et al., 2018), culture may play a role in the stigma phenomenon. For example, Mannarini et al. (2018) showed that perception of dangerousness of a mental disorder may change among cultures. Considering the relevance dangerousness may play in stigma according to this study, cross-cultural studies should be conducted in future with the aim of investigating the stability of stigma's facets in different cultures. Third, six different aspects of stigma have been evaluated in this research; however, future studies should aim to investigate even more facets of stigma toward mental illness to achieve a more complete understanding of this phenomenon. In addition, future research should compare other external and internal disorders to better understand how stigma works through the implementation of other statistical analyses (i.e., latent trait analysis) (Mannarini & Boffo, 2014a; Mannarini, Boffo, Bertucci, et al., 2013) and longitudinal studies should be conducted to investigate the stability over time of the stigma's facets. Additionally, preventive intervention programs that focus specifically on perception of dangerousness should be designed and evaluated to verify the importance that they appear to play in reducing stigma toward mental illness. Moreover, regarding preliminary statistical analyses performed a clarification should be made. A possible data clustering effect was tested but multilevel analyses were not performed because of the small sample size at the highest level and the low overall ICC values for all but one outcome. In fact, the power of multilevel models usually depends on the highest level of clusters (in this case, regions)—and that would seem to need a sample size of about 20. Although numerous studies suggest that these preliminary analyses should always be done (Heck & Thomas, 2015; Hox et al., 2018), in this case, there are three units resulted in a low statistical power—returning unstable estimates for preliminary analyses. Future studies could increase the sample size to the highest level (taking the whole country) and/or implement different data analysis techniques such as generalized estimated equations (GEE) with robust standard errors. In addition, it should be emphasized that some subjects show an age above 18 years and thus marginally fall within the classic range of adolescence. It is important to note that in the schools where the subjects were recruited the age range is between 12 and 18 years, however, it is not so uncommon to find subjects of a higher age—as in this case. Also, it is worth noting that the number of subjects with ages over 18 is relatively low ($n = 23$; 3.7%) and provides a good representation of students in the Italian school system. Lastly, it should be noted that values of Cronbach's alpha were not excessively high (ranging from .60 to .82). However, it should be underlined that Cronbach's alpha is strictly related to the number of items and the semantic redundancy among them (e.g., Barbaranelli et al., 2014; Rae, 2006; Raykov, 2011; Raykov, 2012; Raykov & Marcoulides, 2011; Zenisky et al., 2002). Consequently, Cronbach's alpha may reflect items that are excessively semantically similar or that capture only a single facet (or a limited part) of a complex phenomenon. In this case, items aimed at evaluating

a complex phenomenon (Mannarini et al., 2022)—such as psychosocial and biogenetic causal beliefs or the recommended treatments. Thus, in this case, the non-excessive values (although acceptable; Nunnally, 1978; Nunnally & Bernstein, 1994) may be due to the fact that alpha is reflecting items that are not semantically redundant—despite the scale is unidimensional (Mannarini et al., 2018; Mannarini et al., 2020; Mannarini et al., 2022). This study seems to be a further confirmation that the goal of anti-stigma initiatives for both internalizing and externalizing disorders should not focus on conveying the idea of mental illnesses as “diseases like any other” (Angermeyer et al., 2011; Larkings & Brown, 2018; Read, 2007; Read et al., 2006). Such anti-stigma initiatives are based on two assumptions: first, ascribing mental disorders to biological factors will reduce the attribution of responsibility to people with mental illness and second, consequently these individuals will also be less socially excluded (Angermeyer et al., 2011; Read et al., 2006). However, biogenetic causal models seem to be ineffective in reducing stigma toward people with mental illness (Angermeyer et al., 2011; Larkings & Brown, 2018; Read et al., 2006). Consequently, preventive interventions should be based on reducing the perception of dangerousness of peers with mental disorders, since, in this way, it seems to be possible to also target the other facets of stigma for both internalizing and externalizing disorders. In this regard, Corrigan et al. (2012) show that both education and contact seem to have some value in stigma reduction and could be implemented in anti-stigma intervention with adolescents.

CONCLUSIONS

In conclusion, these results show that the relationships among stigma's facets seem not to differ between disorders, but scores on stigma facets eventually differ. Specifically, the PNA's results show that there seems to be no differences in the relationships among the facets of stigma between internalizing and externalizing disorders since the network structures remained invariant between the two disorders. Furthermore, perception of dangerousness of peers with ADHD and depression seems to play a central role in stigmatizing attitudes, and, consequently, it represents a possible main target for anti-stigma initiatives with adolescents. Considering that adolescence represents a central moment for the growth and definition of the self, it is important to intervene in this phase to counter stigmatizing attitudes against peers with mental disorders.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interest.

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