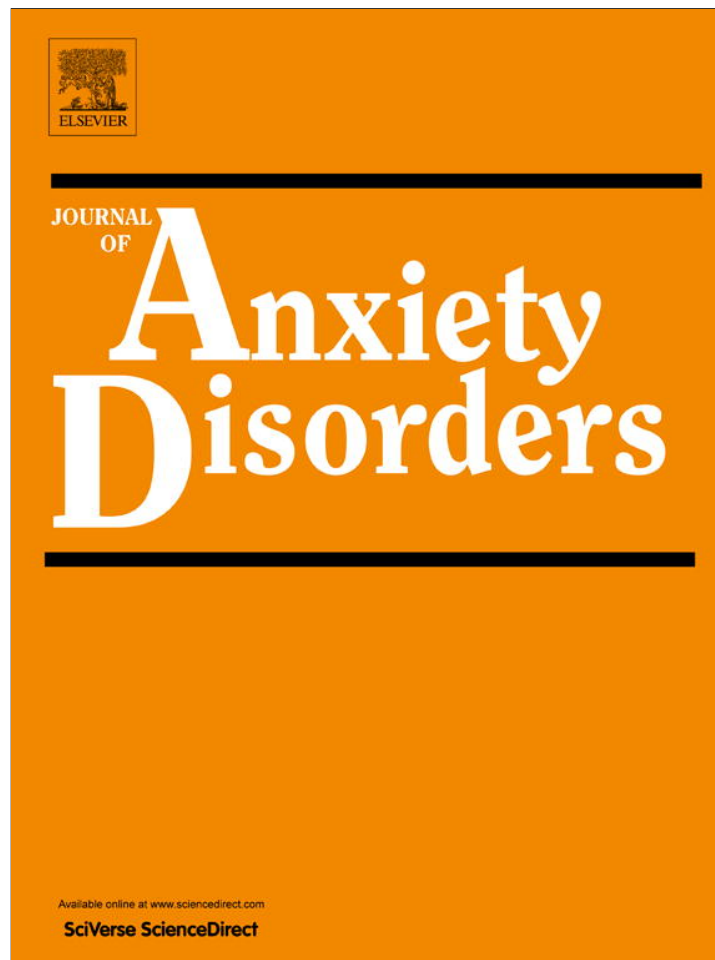


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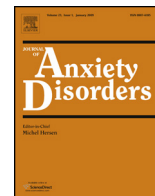
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Early maladaptive schemas and social anxiety in adolescents: The mediating role of anxious automatic thoughts



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ABSTRACT

Cognitive models state that cognitions are organized hierarchically, so that the underlying schemas affect behavior via more automatic, superficial cognitive processes. This study aimed to demonstrate that early maladaptive schemas predict anxious automatic thoughts, and to show that such automatic thoughts act as mediators between schemas and prospective changes in social anxiety symptoms. The study also examined an alternative reverse model in which schemas acted as mediators between automatic thoughts and social anxiety. A total of 1052 adolescents (499 girls and 553 boys; $M_{age} = 13.43$; $SD_{age} = 1.29$) completed measures of early maladaptive schemas, socially anxious automatic thoughts, and social anxiety symptoms at Times 1, 2, and 3. The results revealed bidirectional longitudinal relationships among schemas and automatic thoughts that were consistent in content (e.g., the disconnection/rejection schemas and automatic thoughts of negative self-concept). Furthermore, the automatic thoughts of anticipatory negative evaluation by others at Time 2 mediated the relationship between the other-directedness schemas at Time 1 and social anxiety symptoms at Time 3. These findings are consistent with hierarchical cognitive models of social anxiety given that deeper schemas predict more surface-level thoughts. They also support that these more surface-level thoughts contribute to perpetuating schemas. Finally, results show that early maladaptive schemas of the other-directedness domain play a relevant role in the development and maintenance of social anxiety.

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1. Introduction

Social anxiety disorder (SAD) is the most common anxiety disorder in the general population (Beidel & Turner, 2007; Rosenberg, Ledley, & Heimberg, 2010; Turner, Johnson, Beidel, Heiser, & Lydiard, 2003). The onset is usually in adolescence, although some studies indicate that it can be diagnosed as early as 8 years of age (Beidel, Turner, & Morris, 1999). Epidemiological studies estimate a lifetime prevalence of SAD between 2% and 10% in adolescents (Essau, Conradt, & Petermann 1999, Essau, Conradt, & Petermann, 2002; Kessler, Berglund, Demeler, Jin, Merikangas, & Walters, 2005; Olivares et al., 2003). From adolescence, the prevalence is higher in girls than in boys in samples of the general population (Olivares, Piqueras, & Rosa, 2006). SAD causes numerous problems in various spheres of the individual's life, affecting his or her physical, academic, occupational, and social functioning (Beidel & Turner, 1998; Furmark, 2002; Ledley & Heimberg, 2006; Stein & Gorman, 2001). Unlike other anxiety disorders in which the individual can avoid the situation provoking anxiety, socially anxious adolescents

have to face social situations that elicit their anxious reactions on a daily basis, undermining their quality of life (Beidel & Turner, 1998; Brozovich & Heimberg, 2008; Wittchen, Stein, & Kessler, 1999).

Cognitive models emphasize the role of cognitive and attentional biases in the maintenance of SAD, which become the focus of interventions (e.g., Clark & Wells, 1995; Rapee & Heimberg, 1997; Wells, 1997). According to these models, socially anxious individuals are highly motivated to avoid rejection and make a good impression on others (Leary, 2001; Leary & Kowalski, 1995). However, at the same time, they have a negative view of themselves (Stopa & Clark, 2000; Wells, 1997), which leads them to anticipate that their behavior will be inept or embarrassing (Hofmann, 2007). As a consequence, they anticipate that they will be negatively evaluated by others (Gros, Simms, Antony, & McCabe, 2012; Rapee & Heimberg, 1997; Weeks et al., 2005; Wells, 1997). These negative thoughts are maintained by attentional biases, which contribute to socially anxious individuals selectively attending to social-threat related information (Ledley & Heimberg, 2006).

Overall, contemporary cognitive models of SAD posit that socially anxious individuals have maladaptive schemas regarding themselves and relationships with others, which when activated in social situations would guide the above mentioned cognitive and attentional processes (Heimberg, Borzowich, & Rapee, 2010; Turner

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et al., 2003). However, in contrast with the numerous studies that have documented the role of surface-level cognitions in SAD, relatively few studies have examined cognitions at the more stable and deeper level of schemas (see for a review, Boden et al., 2012). The aim of the current study is to assess the extent to which the early maladaptive schemas, derived from Schema Therapy (Young, 1990; Young, Klosko, & Weishaar, 2003), contribute to explain the maintenance of SAD through the generation of characteristic anxious automatic thoughts involved in SAD.

1.1. Early maladaptive schemas and social anxiety

Beck (1967, 1976) proposed the existence of a hierarchical system of cognitions, ranging from surface-level automatic thoughts to deeper cognitive schemas. Cognitive schemas are “organized structures of stored information that contain individuals’ perceptions of self and others, goals, expectations, and memories” (Beck & Dozois, 2011, p. 398). These schemas guide subsequent situational cognitive processes (i.e., attention, interpretation of incoming events, and retrieval of stored information), and finally result in automatic thoughts. This way, although automatic thoughts are more superficial and proximal to a given situation, they are functionally related to deeper schemas (LaGrange et al., 2011; Pössel, 2011).

Young and colleagues extended the work of Beck and identified a variety of early maladaptive schemas that are hypothesized to underlie several forms of psychopathology (Young, 1990; Young et al., 2003). Early maladaptive schemas are defined as broad, dysfunctional, and pervasive patterns consisting of memories, emotions, cognitions, and bodily sensations about oneself and relationships with others, developed in childhood or adolescence, and elaborated throughout lifetime (Young et al., 2003). The construct of early maladaptive schemas retains the cognitive processing component that is central to earlier definitions of cognitive schemas (Beck, 1967) but places more focus on thematic content and early development of the schemas (Zeigler-Hill, Green, Arnau, Sisemore, & Myers, 2011).

Young (1990, 1999) grouped schemas into five domains or broad categories: disconnection/rejection, impaired autonomy and performance, other-directedness, impaired limits, and overvigilance and inhibition. Several studies have documented the role of these schema domains in a variety of psychological disorders, such as depression, personality disorders, and eating disorders (e.g., Hinrichsen, Waller, & Emanuelli, 2004; Jovev & Jackson, 2004; Reeves & Taylor, 2007; Riso et al., 2006). In contrast, very few studies have examined their role in SAD (see for exceptions, Calvete, Orue, Cámara, & Hankin, 2013; Calvete & Orue, 2008; Hinrichsen et al., 2004; Pinto-Gouveia, Castilho, Gallardo, & Cunha, 2006). Overall, these scarce studies suggest that the most relevant schemas for social anxiety are those of the disconnection/rejection, impaired autonomy, and other-directedness domains. However, with the exception of the study of Calvete et al. (2013), all of the above studies were cross-sectional, so little is known about the prospective predictive relationships among schemas and social anxiety.

How could early maladaptive schemas lead to the development and maintenance of social anxiety symptoms? There is remarkable similarity in content between some early maladaptive schemas and those cognitive biases characteristic of socially anxious individuals. The disconnection/rejection schema domain includes schemas involving the expectation that one’s needs for acceptance and respect will not be predictably fulfilled. As mentioned, fear of being rejected and fear of being negatively evaluated by others play a central role in the development and maintenance of SAD (Weeks & Howell, 2012). In social situations socially anxious individuals anticipate disastrous consequences in terms of loss of status and rejection (Clark & Wells, 1995). Furthermore, the

disconnection/rejection domain includes the defectiveness or shame schema, which describes the belief that one is defective, unwanted, or invalid in significant aspects. The content of this schema is consistent with the negative perceptions of the self as a social object that socially anxious individuals display (Clark & Wells, 1995; Hofmann, 2007; Ledley & Heimberg, 2006).

The domain of impaired autonomy consists of expectations about oneself and the environment that interfere with one’s perceived capacity to function independently or perform successfully. It includes the failure schema, which describes the belief that one has failed, will inevitably fail, or is fundamentally inadequate relative to one’s peers, in areas of achievement. This content is consistent with the beliefs of socially anxious individuals that others are more socially competent and capable and that they will act awkwardly in social situations (Turner et al., 2003).

Finally, the schemas within the domain of other-directedness consist of an extreme focus on others’ desires, at the expense of one’s own needs. This domain includes the schemas of subjugation and approval-seeking. Subjugation involves an excessive surrendering of control to others because the individual feels coerced or to avoid rejection. Approval-seeking reflects an excessive concern about the approval of others and pleasing them. Thus, these schemas are also consistent with the high motivation of socially anxious individuals to make a good impression in others and avoid being rejected by them (Leary, 2001; Ledley & Heimberg, 2006) as well as with the desire of a perfectionistic self-presentation (Nepon, Flett, Hewitt, & Molnar, 2011).

Therefore, early maladaptive schemas would guide information processing when individuals are faced with social situations, leading to characteristic anxious automatic thoughts (e.g., that they will fail and will be evaluated negatively for others), which in turn would provoke anxious reactions. This hypothesis has not previously been assessed. However, as indirect support for that hypothesis, Nepon et al. (2011) found that interpersonal rumination mediated the link between perfectionistic self-promotion and social anxiety symptoms in a sample of college students. This study was cross-sectional, so it was not possible to test predictive relationships among variables. However, longitudinal investigation focused on other psychological problems has demonstrated that schemas guide situational information processing. For instance, schemas related to violence guide social information processing and this in turn predict future aggressive behavior (Calvete & Orue, 2012a; Zelli, Dodge, Lochman, Laird, & Conduct Problems Prevention, 1999). Also in the field of depression, some experimental studies have indicated that cognitive schemas, experimentally activated, guide the subsequent information processing (e.g., Dozois & Backs-Dermott, 2000), and that ruminative thoughts mediate between cognitive schemas and depression (Spasojevic & Alloy, 2001).

On the other hand, automatic thoughts in turn could contribute to strengthening schemas. Young et al. (2003) described several mechanisms through which schemas perpetuate, including all the thoughts, often in form of self-fulfilling prophecies, which end up reinforcing the schema. Through negative automatic thoughts, “the individual misperceives situations in such a manner that the schema is reinforced, accentuating information that confirms the schema and minimizing or denying information that contradicts the schema” (Young et al., 2003; p. 30). This mechanism would contribute to account for the stability of schemas over time (Rijkeboer, Van den Bergh, & Van den Bout, 2005; Riso et al., 2006).

1.2. Overview of the current study

This study is based on the assumption that cognitions are organized hierarchically, so that the underlying schemas affect behavior via more automatic and surface-level cognitive processes (Beck,

1967; Beck & Dozois, 2011; Ingram & Kendall, 1986). Namely, this investigation aimed to demonstrate that early maladaptive schemas predict socially anxious automatic thoughts among adolescents, and to show that such automatic thoughts mediate the longitudinal association between schemas and later elevations of social anxiety symptoms. However, as schema theory involves the assumption that negative automatic thoughts contribute to reinforce schemas, we also tested a reverse hypothesis including paths from negative automatic thoughts to early maladaptive schemas, and from these to social anxiety.

From a methodological viewpoint, the verification of a mediation mechanism has some prerequisites. The first is that the study should be longitudinal, including at least three waves of data. Only thus will it be possible to confirm that the predictor variables (e.g., early maladaptive schemas) at Time 1 predict prospective change in the mediator variables (e.g., anxious automatic thoughts) at Time 2, and that, in turn, these latter ones predict the outcome variable (i.e., social anxiety) at Time 3. Moreover, it is necessary to control for prior measurements of the mediational variables and outcome variables in order to provide a rigorous, exacting test of mediation (Cole & Maxwell, 2003).

We included the three early maladaptive schema domains (disconnection/rejection, impaired autonomy, and other-directedness) that, according to previous studies and to cognitive models of SAD, could be the most relevant for social anxiety symptoms. We also included three categories of anxious automatic thoughts: negative self-concept, anticipatory failure in performance, and anticipatory negative evaluation by others.

The study was conducted with a sample of adolescents, a key period to study social anxiety as the onset of SAD is usually in adolescence. Adolescents are frequently encountering several stressful social situations (e.g., academic, peers relationships, and romantic relationships) that can trigger social anxiety symptoms. However, very scarce research has explored cognitive models of SAD within the adolescent population. Although overall these studies indicate that socially anxious adolescents exhibit cognitive biases for negative social events that are similar to those displayed in adult samples (Rheingold, Herbert, & Franklin, 2003), Alfano, Beidel and Turner (2008) found that the characteristic negative self-images displayed by socially anxious adults were not present in socially anxious adolescents, so that they seemed to be a consequence more than an antecedent of SAD. These findings indicate the necessity of studying cognitive mechanisms of SAD in this developmental stage.

Finally, as epidemiological studies indicate that the prevalence of SAD is higher in girls than in boys (Olivares et al., 2006), we examined sex differences in the role of early maladaptive schemas and anxious automatic thoughts as predictors of social anxiety. We expected that some of these paths would be stronger in girls than in boys.

2. Material and methods

2.1. Participants

The initial sample was made up of 1311 adolescents, high school students from 51 classrooms of 8 educational centers of Bizkaia (Spain). Of the 1311 adolescents, 1052 (499 girls and 553 boys) completed the measures at the three waves of the study (participation rate: 80.24%). The reasons given for almost the entire attrition rate was absence from school because of illness. Adolescents were between 13 and 17 years old at the beginning of the study ($M = 13.43$; $SD = 1.29$). The socio-economic levels were determined applying the criteria recommended by the Spanish Society of Epidemiology (2000) and from the information about parental education and income. The socio-economic levels were represented

with the following distribution: 19.1% low, 17.5% low-medium, 25.8% medium, 18.7% high-medium, and 18.6% high levels.

2.2. Instruments

Social anxiety symptoms were assessed with the *Social Anxiety Scale for Adolescents* (SAS-A; La Greca & López, 1998). The SAS-A is a self-report scale for adolescents adapted by La Greca and López (1998) from the SAS-Revised (La Greca & Stone, 1993). The SAS-A contains 18 items in the form of statements about oneself (e.g., *I get nervous when I talk to peers that I don't know very well*) that participants have to respond on a scale from 1 (*not at all*) to 5 (*all the time*). The SAS-A includes items regarding fear of negative evaluation, social avoidance and distress specific to new situations, and general social avoidance. It has obtained good reliability and validity (Inderbitzen-Nolan & Walters, 2000; La Greca & López, 1998). The Spanish version of the questionnaire has also obtained good psychometric properties (Olivares et al., 2005). Alpha coefficients in this study were .89 and .92 and .92 for T1, T2, and T3 respectively.

Social anxious automatic thoughts were measured by means of the *Social Cognitions Questionnaire* (SCQ; Wells, Stopa, & Clark, 1993). The SCQ comprises 22 automatic thoughts about social situations (e.g., *I am foolish; People won't be interested in me*). Participants rated the frequency of each thought during the last week on a 1 (*never occurs*) to 5 (*always occurs*) scale. The SCQ includes three categories of automatic thoughts: negative self-concept, anticipatory performance failure, and anticipatory negative evaluation by others. The SCQ has good test-retest reliability and internal consistency (Stopa, 1995), and differentiates between high and low socially anxious individuals (Tanner, Stopa, & De Houwer, 2006). The Spanish version has shown excellent psychometric properties and confirmation of the three-factor structure (Calvete & Orue, 2012b). Alpha coefficients in this study were .81, .79 and .82 for negative self-concept at T1, T2, and T3, .83, .84, and .79 for anticipatory performance failure at T1, T2 and T3, and .82, .81, and .83 for anticipatory negative evaluation for T1, T2, and T3.

Cognitive schemas were assessed using the *Young Schema Questionnaire-3* (YSQ-3; Young, 2006). The YSQ-3 consists of 90 items and assesses 18 cognitive schemas (5 items per schema). Participants rated items using a 6-point scale from 1 (*completely untrue of me*) to 6 (*describes me perfectly*). In this study the YSQ-3 was used to assess the domains of disconnection/rejection, impaired autonomy, and other-directedness, which are the domains that have been found to relate to social anxiety in previous studies (Calvete et al., 2013; Hinrichsen et al., 2004; Pinto-Gouveia et al., 2006).

The domain of disconnection/rejection includes schemas that involve the expectation that one's needs for security, acceptance, and respect will not be fulfilled in a predictable way. In this study the schemas included in this domain were abandonment, mistrust, emotional deprivation, and defectiveness. Abandonment refers to the perception that significant others will not go on giving emotional support because they will abandon the person in favor of someone better (e.g., "I need other people so much that I worry about losing them"). Mistrust describes the expectation that others will hurt, abuse, or humiliate (e.g., "I feel that people will take advantage of me."). Defectiveness or shame describes the feeling that one is defective, unwanted, or invalid in significant aspects (e.g., "I feel that I'm not lovable"). And emotional deprivation involves the belief that others will not adequately meet one's need of emotional support (e.g., "For much of my life, I haven't felt that I am special to someone").

The domain of impaired autonomy consists of expectations about oneself and the environment that interfere with one's perceived capacity to function independently or perform successfully. The schemas of this domain included in the present study were vulnerability to harm and failure. Vulnerability to harm

involves an exaggerated fear that random catastrophe could strike at any time and that one will be unable to prevent it (e.g., “I can’t seem to escape the feeling that something bad is about to happen.”). Failure describes the belief that one has failed, will inevitably fail, or is fundamentally inadequate relative to one’s peers, in areas of achievement (e.g., “I’m incompetent when it comes to achievement”).

The schemas within the domain of other-directedness consist of an extreme focus on the desires of others, at the expense of one’s own needs. The schemas of this domain that were included in the study were subjugation and approval-seeking. Subjugation involves an excessive surrendering of control to others because the individual feels coerced, or to avoid anger, retaliation, or abandonment (e.g., “I feel that I have no choice but to give into other people’s wishes, or else they will retaliate or reject me in some way”). Approval-seeking reflects an excessive concern about the approval of others and pleasing them (e.g., “If I do not receive approval of others, I feel less important”).

The Spanish version of the YSQ-3 has showed good psychometric properties, with confirmation of the factor structure and adequate alpha coefficients for the scales (Calvete, Orue, & Gonzalez-Diez, in press). Alpha coefficients were .89, .91, and .91 for disconnection/rejection at T1, T2, and T3, .81, .84, and .83 for impaired autonomy at T1, T2, and T3, and .86, .86, and .87 for other-directedness at T1, T2, and T3.

2.3. Procedure

The adolescents filled in the questionnaires in their classrooms. The time interval between measures was 6 months. The adolescents completed measures of social anxiety, anxious automatic thoughts and early maladaptive schemas. In order to pair the questionnaires of T1, T2, and T3, a code known only by the participant was used. Some questionnaires could not be paired because of errors in the codes and were therefore eliminated; this comprised part of the attrition rate. Participation was voluntary. Participants were informed that their responses were confidential and would only be read by the investigation team. The Ethics Committee of University of Deusto approved this study. Because there were no student names included on the surveys, the school staff chose to collect passive consent from parents. Thus, parents were informed and given

the option of refusing to allow their son/daughter’s participation. No parent refused to allow their children’s participation.

3. Results

3.1. Preliminary data analysis

Before starting with the analysis of data we first tested whether those adolescents who dropped out of the study after T1 or T2 were significantly different from those respondents who completed the questionnaires at all three time points. Results showed that there were no differences in any of the variables of the study between the 1052 adolescents who completed the three waves and those who failed to complete the study. These preliminary analyses suggest that any missing data are missing at random. Pairwise deletion was used to handle these missing data and cases with missing data were excluded from the specific analyses.

Next, we carefully inspected our data for univariate and multivariate outliers. Univariate outliers were defined as those participants who scored higher than 3 SD above or below the mean. No univariate outliers were found. Moreover, a screening for multivariate outliers was conducted on all research variables in the model by the SPSS Mahalanobis distance test. No multivariate outlier was detected, and therefore the multivariate normality assumption was not violated in this sample. Finally, the data expressed multivariate normality tested through Mardia’s test of multivariate kurtosis.

3.2. Descriptive analyses

Table 1 displays correlations between the variables of the study, which were statistically significant in all of the cases. Table 2 displays descriptive statistics. The overall prevalence of clinically significant social anxiety, using the cutoff score of 50 or more on the SAS-A (La Greca & López, 1998), was 25.8, 25.4, and 23.8% at T1, T2, and T3, respectively.

3.3. Measurement model of schema domains, anxious automatic thoughts, and social anxiety

3.3.1. Model fit of the measurement models

In the first step, we explored the model fit of the measurement model for the latent variables of the study at each of the three

Table 1
Main statistics of the variables of the study.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
T1 social anxiety	1																			
T1 disconnection/rejection	.65	1																		
T1 impaired autonomy	.47	.70	1																	
T1 other-directedness	.68	.79	.62	1																
T1 negative self-concept AT	.55	.60	.49	.55	1															
T1 failure AT	.52	.50	.46	.51	.67	1														
T1 evaluation by others AT	.64	.61	.47	.62	.74	.72	1													
T2 social anxiety	.59	.51	.38	.52	.40	.39	.48	1												
T2 disconnection/rejection	.52	.66	.50	.57	.49	.41	.50	.72	1											
T2 impaired autonomy	.41	.54	.66	.46	.42	.40	.42	.58	.76	1										
T2 other-directedness	.53	.58	.44	.65	.45	.42	.51	.74	.83	.67	1									
T2 negative self-concept AT	.39	.43	.34	.42	.51	.40	.43	.61	.64	.55	.60	1								
T2 failure AT	.38	.36	.32	.38	.37	.51	.41	.59	.53	.51	.51	.70	1							
T2 evaluation by others AT	.47	.48	.35	.50	.46	.46	.54	.70	.67	.54	.66	.78	.74	1						
T3 social anxiety	.54	.46	.34	.45	.38	.38	.44	.66	.55	.44	.57	.45	.44	.51	1					
T3 disconnection/rejection	.45	.59	.43	.48	.42	.34	.42	.56	.68	.53	.60	.46	.38	.48	.71	1				
T3 impaired autonomy	.32	.45	.55	.37	.34	.31	.32	.40	.54	.66	.47	.38	.35	.36	.53	.72	1			
T3 other-directedness	.47	.53	.39	.56	.44	.40	.46	.59	.61	.47	.68	.48	.42	.52	.74	.81	.64	1		
T3 negative self-concept AT	.36	.42	.36	.37	.47	.36	.42	.43	.49	.43	.46	.52	.40	.46	.58	.62	.56	.57	1	
T3 failure AT	.35	.34	.31	.33	.37	.45	.39	.42	.42	.38	.42	.40	.49	.41	.56	.54	.52	.53	.73	1
T3 evaluation by others AT	.43	.42	.34	.42	.44	.38	.48	.51	.51	.43	.52	.47	.43	.53	.65	.63	.54	.64	.79	.75

Note: AT = automatic thoughts. All coefficients are significant at $p < .001$.

Table 2
Sex differences in the variables of the study.

	Girls n = 499		Boys n = 553		F(1, 1051)	Cohen's d	Total sample	
	M	SD	M	SD			M	SD
T1 social anxiety	43.00	12.53	39.82	12.86	15.27*	0.25	40.84	13.02
T1 disconnection/rejection	2.42	0.81	2.24	0.83	25*	0.22	2.32	0.83
T1 impaired autonomy	2.63	0.95	2.33	0.90	36**	0.32	2.50	0.95
T1 other-directedness	3.04	0.94	2.73	0.90	45**	0.34	2.84	0.93
T1 self-concept AT	1.85	0.74	1.66	0.67	17**	0.27	1.76	0.71
T1 failure AT	2.09	0.75	1.81	0.64	45**	0.40	1.94	0.71
T1 negative evaluation AT	2.18	0.84	1.92	0.76	32**	0.33	2.03	0.80
T2 social anxiety	42.24	12.97	38.74	13.43	19**	0.26	40.53	13.80
T2 disconnection/rejection	2.33	0.84	2.15	0.90	14**	0.21	2.24	0.88
T2 impaired autonomy	2.49	1.00	2.28	0.98	16**	0.21	2.38	0.99
T2 other-directedness	2.89	0.99	2.60	0.99	28**	0.29	2.73	1.00
T2 self-concept AT	1.76	0.70	1.68	0.73	5	0.11	1.72	0.74
T2 failure AT	2.00	0.76	1.79	0.69	24**	0.29	1.90	0.74
T2 negative evaluation AT	2.07	0.80	1.89	0.80	18**	0.23	1.98	0.81
T3 social anxiety	41.24	12.82	38.37	13.97	12**	0.21	39.70	13.48
T3 disconnection/rejection	2.27	0.86	2.11	0.88	10*	0.18	2.18	0.87
T3 impaired autonomy	2.41	0.97	2.20	0.92	14**	0.22	2.29	0.95
T3 other-directedness	2.79	1.01	2.51	0.97	22**	0.28	2.64	1.00
T3 self-concept AT	1.76	0.74	1.71	0.79	1	0.07	1.73	0.77
T3 failure AT	2.02	0.76	1.83	0.78	18**	0.25	1.92	0.78
T3 negative evaluation AT	2.07	0.82	1.90	0.81	13**	0.21	1.98	0.82

Note: AT = automatic thoughts.

* $p < .01$.

** $p < .001$.

time points. Testing the measurement model is a necessary step that provides a basis against which more parsimonious structural models can be compared (Cole & Maxwell, 2003). The models were tested via maximum likelihood (ML) estimation with LISREL 8.8 (Jöreskog & Sörbom, 2006). Following the recommendations of Hu and Bentler (1999) for maximum likelihood models obtained in large samples ($N > 250$), goodness of fit was assessed by the comparative fit index (CFI; values of .95 or greater indicate that the model adequately fits the data), the non-normed fit index (NNFI; values of .95 or greater indicate that the model adequately fits the data), and the root mean squared error of approximation (RMSEA; values of .06 or less indicate that the model adequately fits the data).

Item-parcels were used as indicators of the latent variables. Three parcels were used as indicators for schema domains and depressive symptoms, following the proposals of Little, Cunningham, Sahar, and Widamar (2002). However, only two parcels were used for each category of automatic thoughts due to the relatively small number of items included within each category of automatic thoughts. The error variances of the parcels were not allowed to covary in any model. Our hypothesized model consisted of seven correlated latent variables corresponding to the three schema domains (disconnection/rejection, impaired autonomy, and other-directedness), the three categories of anxious automatic thoughts (negative self-concept, failure, and evaluation by others), and social anxiety. The fit indexes were adequate for this measurement model at T1 [$\chi^2(69, n = 1311) = 334, p < .001, RMSEA = .05$ (90% Confidence Interval: .04; .05), NNFI = .99, CFI = 1, SRMR = .02] at T2 [$\chi^2(69, n = 1201) = 470, p < .001, RMSEA = .06$ (90% Confidence Interval: .05; .06), NNFI = .99, CFI = .99, and at T3 [$\chi^2(69, n = 1052) = 460, p < .001, RMSEA = .07$ (90% Confidence Interval: .06; .07), NNFI = .99, CFI = .99]. Thus, these results are consistent with schema domains, automatic thoughts, and social anxiety symptoms being different, albeit related, latent constructs.

3.3.2. Establishing measurement invariance over time

In the second step, we examined whether the measurement model was equivalent over time. To determine whether the measurement model could be considered equivalent (or invariant) over

time, we tested the model fit of two alternative models (differing in levels of parameter restrictions) and compared them to one another using the corrected Chi-square difference test (Satorra & Bentler, 2001). The error terms of the same variable assessed on different occasions were conceptualized as correlated with each other because of the assumption that factors contributing to measurement error in any specific variable will be consistent across measure occasions (Martens & Haase, 2006).

First, we undertook a longitudinal confirmatory factor analysis, which included all observed and latent variables from each time, with freely estimated parameters. This measurement model showed good fit indexes, $\chi^2(800, n = 1052) = 3911, p < .001, RMSEA = .05$ (90% Confidence Interval: .05; .06), $p = 1, NNFI = .99, CFI = .99$. We compared this model with a more restrictive model in which factor loadings within constructs across the three time points were specified as equal, $\chi^2(800, n = 1052) = 3936, p < .001, RMSEA = .05$ (90% Confidence Interval: .05; .06), $p = 1, NNFI = .99, CFI = .99$. This comparison, using the corrected Chi-square difference test showed that the model fit of the more restrictive longitudinal model was not significantly worse than that of the less restrictive longitudinal model (specifying freely estimated parameters), $\Delta\chi^2(16, n = 1052) = 25, p = .07$.

3.4. Longitudinal relationships among schemas, automatic thoughts, and social anxiety

3.4.1. Autoregressive model

The next step was to test an autoregressive model, which included auto-regressive paths over time between the three categories of anxious automatic thoughts, social anxiety, and schema domains. This model suggests that each construct is the best predictor of itself over time. Overall, the autoregressive paths were higher for schema domains than for automatic thoughts (see Fig. 1). The model explained 49, 52, and 51% of the variance of disconnection/rejection, impaired autonomy, and other-directedness schema domains, and 30, 18, and 33% of negative self-concept, failure, and negative evaluation by others thoughts, respectively. Fit indexes were excellent for the autoregressive model, $\chi^2(802,$

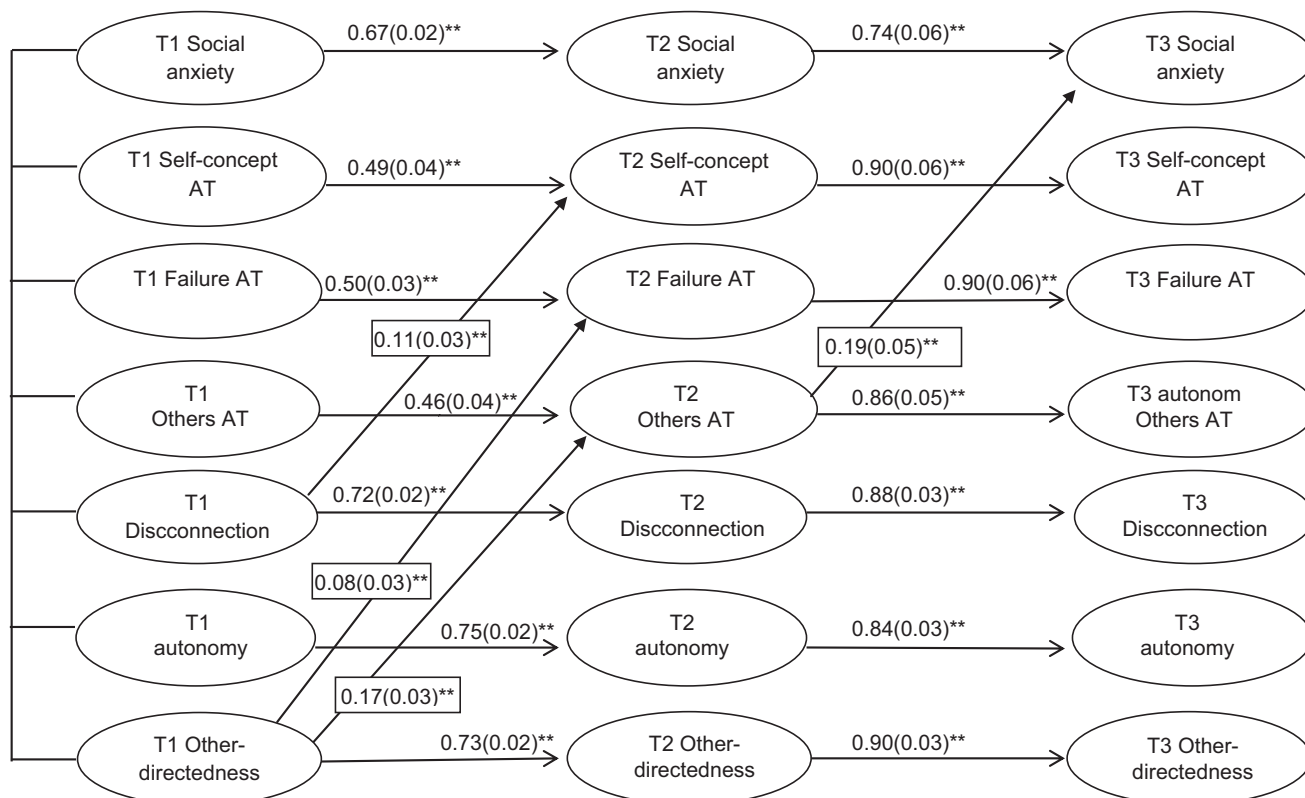


Fig. 1. Hypothesized mediational model between schemas domains, automatic thoughts, and social anxiety. Note: Values given are nonstandardized coefficients. Standard errors are in parentheses. * $p < .05$. ** $p < .001$. Cross-lagged paths are represented in boxes.

$n = 1052$) = 2578, $p < .001$; RMSEA = .04 (90% Confidence Interval: .04; .04), $p = 1$, NNFI = .99, CFI = .99.

3.4.2. Hypothesized mediational model

Building on the above autoregressive model, we tested the model fit of the hypothesized model, which included paths between T1 schema domains and T2 automatic thoughts, and between T2 automatic thoughts and T3 social anxiety. The results indicated that T1 other-directedness schemas significantly predicted T2 automatic thoughts of failure and evaluation by others. T1 disconnection/rejection schemas predicted T2 negative thoughts of self-concept. Of the three categories of automatic thoughts, only the evaluation by others predicted T3 social anxiety. None of the direct paths from schema domains to social anxiety were significant. A more parsimonious model was estimated including only significant paths. The fit indexes were excellent for this model, $\chi^2(798, n = 1052) = 2537, p < .001$; RMSEA = .04 (90% Confidence Interval: .04; .04), $p = 1$, NNFI = .99, CFI = .99. Fig. 1 displays the resulting mediational model.

The significance of the indirect effect of other-directedness schemas on social anxiety via automatic thoughts was tested by means of a bootstrapping procedure. In this study, we created 1000 bootstrap samples from the original data set by random sampling with replacement, and the covariance matrix was estimated from each sample. The second step was to conduct the structural model 1000 times with these 1000 bootstrap covariances to yield 1000 estimations of each path coefficient. The third step was to use LISREL's saved output of the 1,000 estimations of each path coefficient to calculate an estimate of the indirect effect. The final step was to see whether the 95% confidence interval (CI) for the estimated indirect effect included zero. According to Shrout and Bolger's (2002) proposal, an indirect effect is significant at the .05 level if the 95% confidence level does not include zero. Using the criterion of Shrout

and Bolger, the results indicated that the indirect effect was significant for mediation via automatic thoughts of evaluation by others, Mean = .034, BC bootstrap 95% CI = .034–.035.

3.4.3. Reverse mediational model

Next, we estimated a unidirectional reverse model, in which T1 automatic thoughts predicted T2 schema domains, and these in turn predicted T3 social anxiety. This model revealed significant paths from T1 automatic thoughts of failure automatic to T2 impaired autonomy schemas, from T1 automatic thoughts of negative self-concept to T2 disconnection/rejection schemas, and from T1 automatic thoughts of evaluation by others to T2 other-directedness schemas. In addition, T2 other-directedness schemas predicted T3 social anxiety. A more parsimonious model was estimated including only significant paths. Model fit was excellent also for this model, $\chi^2(798, n = 1052) = 2544, p < .001$; RMSEA = .04 (90% Confidence Interval: .04; .04), $p = 1$, NNFI = .99, CFI = .99. The significance of the indirect effect of the automatic thoughts of negative evaluation on social anxiety via other-directedness schema domain was tested by means of a bootstrapping procedure. The results indicated that the indirect effect was significant, Mean = .028, BC bootstrap 95% CI = .027–.029. Fig. 2 displays the results of this model.

3.4.4. Bidirectional model

Finally, we combined the above unidirectional models within a bidirectional model. The significant paths of this bidirectional longitudinal model are illustrated in Fig. 3. The relationships between disconnection/rejection schemas and automatic thoughts of negative self-concept, and between other-directedness schemas and automatic thoughts of evaluation by others were bidirectional, suggesting that these categories of schemas and automatic thoughts influence each other. In addition, the other-directedness

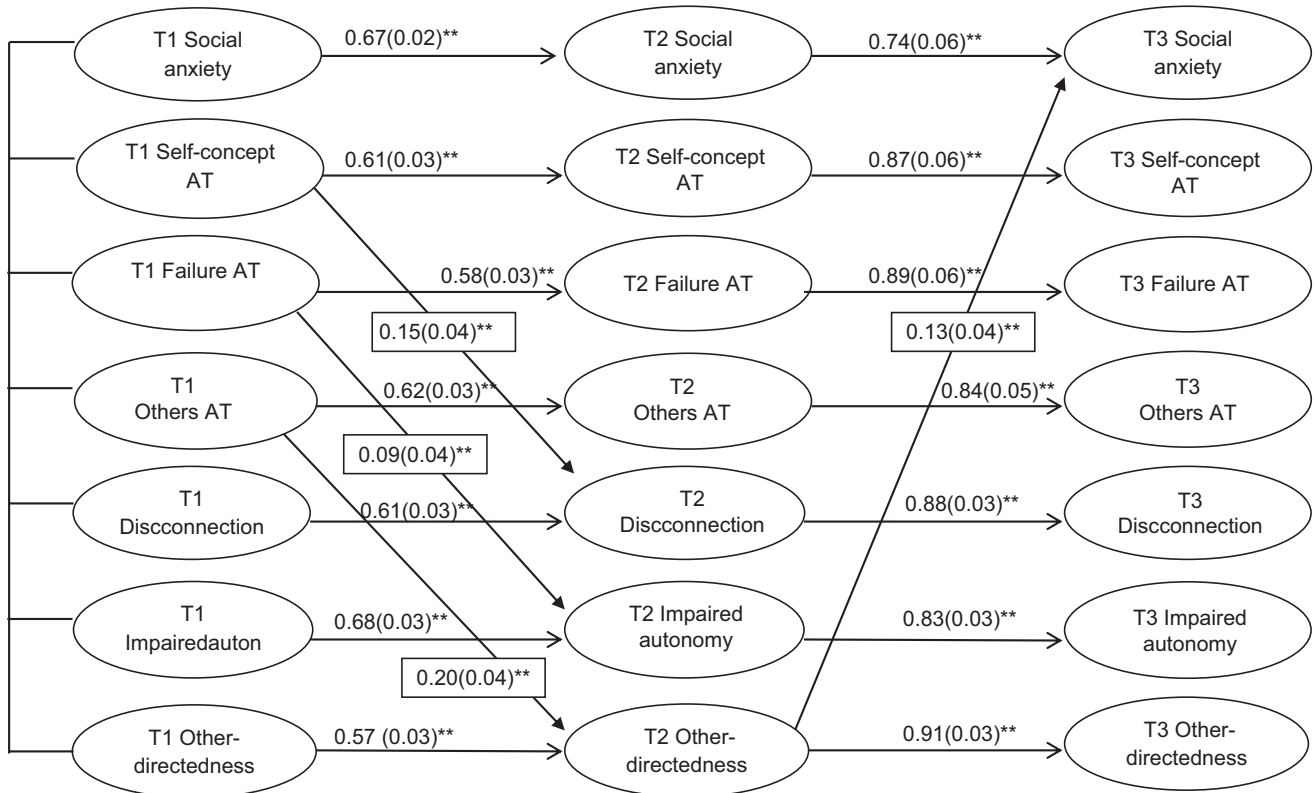


Fig. 2. Reverse mediational model between automatic thoughts, schema domains and social anxiety. Note: Values given are nonstandardized coefficients. Standard errors are in parentheses. * $p < .05$. ** $p < .001$. Cross-lagged paths are represented in boxes.

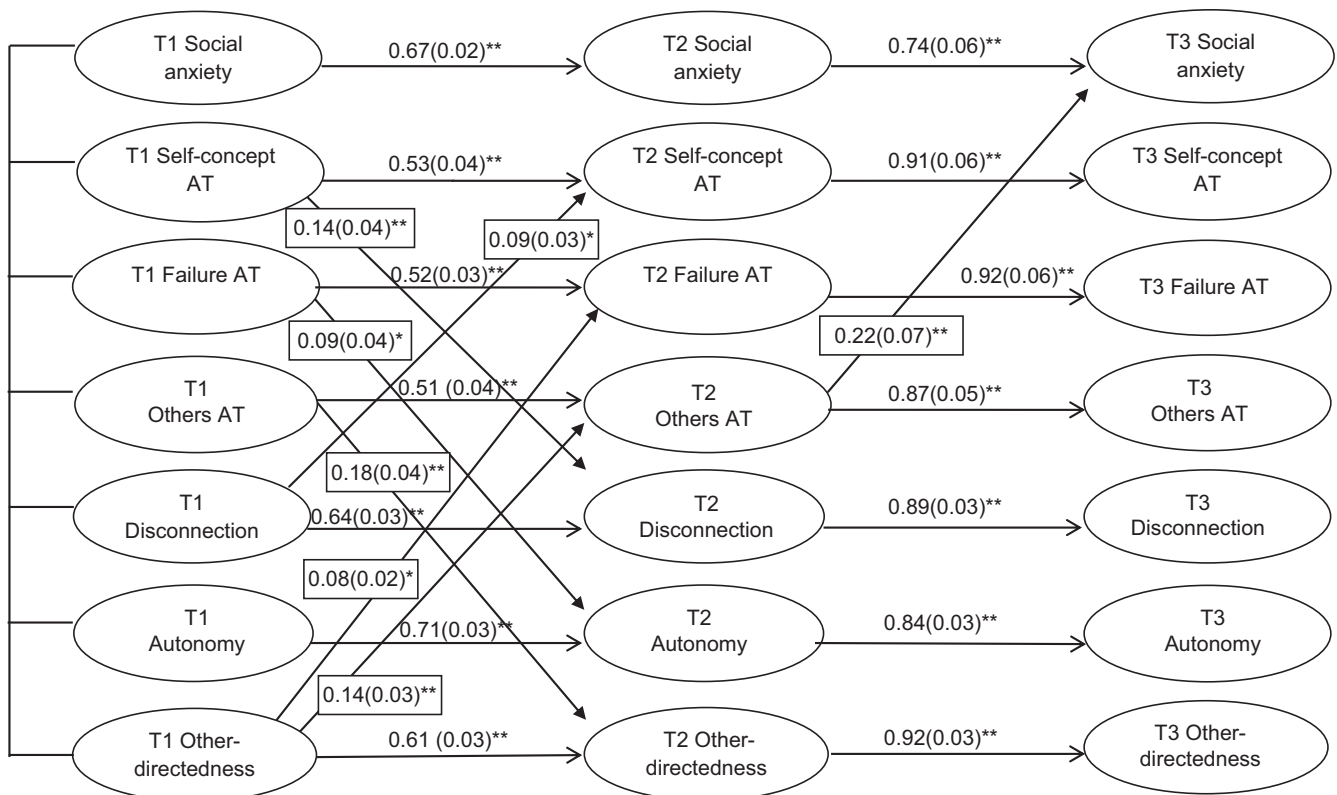


Fig. 3. Bidirectional mediational model between schema domains, automatic thoughts, and social anxiety. Note: Values given are nonstandardized coefficients. Standard errors are in parentheses. * $p < .05$. ** $p < .001$. Cross-lagged paths are represented in boxes.

schemas predicted the increase of automatic thoughts of failure, and thoughts of failure predicted the worsening of impaired autonomy schemas. However, only T2 automatic thoughts of evaluation by others predicted the increase of social anxiety at T3. This indicates that when all unidirectional paths are tested simultaneously, this category of automatic thoughts mediates the relationship between other-directedness schemas and social anxiety, but other-directedness schemas do not mediate the relationship between automatic thoughts of evaluation by others and social anxiety. The fit indexes for the bidirectional model were $\chi^2(795, n = 1052) = 2508, p < .001$; RMSEA = .04 (90% Confidence Interval: .04; .04), $p = 1$, NNFI = .99, CFI = .99. The significance of the indirect effect via automatic thoughts of evaluation by others was tested by means of a bootstrapping procedure. The results indicated that the indirect effect was significant, Mean = .036, BC bootstrap 95% CI = .035–.037.

3.5. Sex differences in the mediational model

The next step was to examine sex differences in the above pathways. Table 2 displays sex differences for all the variables in the study. Adolescent girls scored higher on all of the variables except on automatic thoughts of negative self-concept at T2 and T3.

We investigated whether the cross-lagged path coefficients of the bidirectional model were equivalent across boys and girls through a multiple-group analysis. For this purpose, the following steps were carried out. First, we estimated the model for boys and girls separately. The fit indexes were adequate for boys, $\chi^2(795, n = 553) = 2184, p < .001$; RMSEA = .04 (90% Confidence Interval: .04; .05), $p = 1$, NNFI = .99, CFI = .99, and for girls, $\chi^2(795, n = 499) = 1714, p < .001$; RMSEA = .04 (90% Confidence Interval: .04; .05), $p = 1$, NNFI = .99, CFI = .99. Second, we tested the configural invariance of the model to demonstrate that the pattern of fixed and free parameters was equivalent across both subsamples, $\chi^2(1590, N = 1052) = 3527, p < .001$, RMSEA = .04 (90% Confidence Interval: .04; .05), $p = 1$, NNFI = .99, CFI = .99. Third, we tested whether the relative factor loadings were equivalent across both subsamples. This imposition increased χ^2 significantly, $\Delta\chi^2(8, n = 1052) = 37, p < .001$. An examination of the modification indexes revealed that the factor loading corresponding to one of the indicators of the latent variable disconnection/rejection was different across subsamples. Thus, a partial factorial invariance with this parameter freely estimated was tested, obtaining a non-significant increase of χ^2 , $\Delta\chi^2(7, n = 1052) = 13, p = .07$. Finally, we tested the invariance of the cross-lagged paths linking the latent variables over time. This constriction did not increase χ^2 significantly, $\Delta\chi^2(7, N = 1052) = 11, p = .14$, indicating that the overall pattern of paths was invariant between male and female adolescents.

4. Discussion

Socially anxious adolescents experience several anxious automatic thoughts when faced with social situations. The results of this study show that some of these thoughts are guided by deeper schemas and that those anxious automatic thoughts contribute to perpetuating schemas. The findings emerging from this study are summarized below.

4.1. Mediational pathways among early maladaptive schemas, anxious automatic thoughts, and social anxiety

One of the main findings of this study is that temporal relationships among early maladaptive schemas and automatic thoughts are bidirectional. That is, the results suggest that maladaptive schemas guide cognitive processing resulting in anxious negative

automatic thoughts when adolescents cope with social scenarios, and at the same time, these automatic thoughts contribute to perpetuating maladaptive schemas. These bidirectional relationships were particularly evident for the disconnection/rejection schemas and negative automatic thoughts regarding self-concept, on the one hand, and for the other-directedness schemas and automatic thoughts regarding evaluation by others, on the other hand. These schema domains and automatic thoughts share similar content, which enhances their reciprocal relationship. The study also revealed that the other-directedness schemas predicted automatic thoughts of anticipatory failure and that these thoughts contributed to worsening of the impaired autonomy schemas.

More specifically, findings provide support for the mediational hypothesis that early maladaptive schemas predict prospective change in symptoms of social anxiety via increases in anxious automatic thoughts. Namely, the results point to the schemas of the other-directedness domain as particularly relevant for social anxiety. These schemas increase the likelihood that adolescents experience negative automatic thoughts regarding the anticipation that they will fail and will be evaluated negatively by others, aspects widely identified by most of the cognitive models of social anxiety (Gros et al., 2012; Rapee & Heimberg, 1997; Stopa & Clark, 2000; Weeks et al., 2005; Wells, 1997). However, in this study, only those thoughts related to evaluation by others predicted the increase in social anxiety at T3, and consequently mediated the association between schemas and later social anxiety.

The other-directedness domain includes the schema of approval-seeking, which is very similar to the construct of perfectionistic self-promotion. Nepon et al. (2011) found that those students who scored high on perfectionistic self-promotion, consisting of a wish to look perfect to others, displayed more interpersonal rumination, which in turn was associated with symptoms of social anxiety. However, their study was cross-sectional. Thus, our current study adds predictive validity to the mediational mechanisms involved in the maintenance of social anxiety.

The other two schema domains did not predict the increase of social anxiety via automatic thoughts. The impaired autonomy schema domain did not predict any category of automatic thoughts nor social anxiety. The disconnection/rejection schemas predicted an increase in the occurrence of negative automatic thoughts about self-concept. However, as this category of automatic thoughts did not predict the increase in social anxiety, it was not a significant direct or indirect effect of disconnection/rejection on social anxiety. As previous evidence for the role of the disconnection/rejection in social anxiety was obtained in cross-sectional studies (Calvete & Orue, 2008; Pinto-Gouveia et al., 2006), additional longitudinal research is required to examine the predictive role of the disconnection/rejection schemas in the field of social anxiety and clarify these mixed results.

It is important to note that although the reverse model indicated that the other-directedness schemas acted as mediators between automatic thoughts and social anxiety, this mediational path did not remain significant in the stricter bidirectional model, where all paths were tested simultaneously. This finding supports our initial hypothesis that automatic thoughts would account for the predictive association between schemas and social anxiety.

Consistent with previous studies (Olivares et al., 2006; Ranta et al., 2007), girls displayed more symptoms of social anxiety than boys as well as higher scores on almost all of the cognitive variables. Nevertheless, the pattern of predictive associations among variables was similar for both girls and boys. This finding suggests that these cognitive variables play a similar role in maintaining and predicting prospective cross-lagged social anxiety in boys and girls. Nonetheless, it is possible that higher rates of social anxiety in girls are explained by their higher scores on other-directedness schemas as well as on anxious automatic thoughts. This

mediational hypothesis for sex differences in social anxiety should be examined in future studies.

4.2. Implications for the theory

Findings of this study have implications for cognitive theories of psychopathology (e.g., Beck, 1976; Beck & Dozois, 2011) as they are consistent with the proposal that cognitions are hierarchically organized. It is also important to note that the measurement model analyses of the variables of the study contributed to establish that schemas, anxious automatic thoughts, and symptoms of social anxiety are distinct but interrelated latent variables (see also Calvete & Orue, 2012a, for evidence with violence-related schemas). Moreover, the results not only demonstrate the distinctiveness of the latent variables of the study but also their likely functional associations. Namely, deeper schemas predict the occurrence of anxious automatic thoughts, and these automatic thoughts, in turn, predict increases in social anxiety symptoms over time. Thus, these findings indicate that, although automatic thoughts are more superficial and proximal to a given situation, they are functionally related to one's deeper schemas (Beck & Dozois, 2011), and that they can be interpreted as the most proximal predictor of symptoms of distress (Pössel, 2011). Furthermore, findings of this study also revealed that the automatic thoughts resulting from the above schematic processing contribute in turn to perpetuating schemas, as shown by the significant paths from T1 automatic thoughts to T2 schema domains. Therefore, findings of this study support a transactional model in which different cognitive levels influence each other.

The above mechanisms are also important because they support the assumptions of the Schema Therapy (Young et al., 2003). Young described various mechanisms by which schemas are perpetuated. One mechanism is that schemas guide the cognitive processing so that the individual focuses on those elements that confirm the schema and minimize or deny information that contradict the schema. Regardless of the valence or negativity of the schema, individuals tend to seek data to confirm and perpetuate that schema (Young et al., 2003). Furthermore, main cognitive models of social anxiety have also described the tendency to seek information consistent with the fear of negative evaluation and with a negative image of oneself (Clark & Wells, 1995; Rapee & Heimberg, 1997). For example, socially anxious individuals might actually seek out negative information from people with whom they interact. They are more likely to perceive and attend to information and cues that could be interpreted as social failure, simply because they are more comfortable with this type of information than with incongruent information (Ledley & Heimberg, 2006). Finally, once the individuals misperceive situations and generate negative automatic thoughts, these in turn reinforce the schemas, contributing to their perpetuation.

4.3. Limitations, strengths, and implications for future research

This study has some limitations that provide opportunities for future research. The main limitation is that it relies exclusively on self-reports, which may cause an increase in the relationships among variables because of shared-methods variance (Kliewer, Lepore, Oskin, & Johnson, 1998). Thus, it would be recommendable that future studies examine the mediational hypothesis of this study including reports of others to assess social anxiety (e.g., by means of structured diagnostic interviews). However, it is also important to note that, although self-reports raise reliability and validity problems when used with young children, adolescents usually are capable of answering self-reports in a valid and reliable way (Cunha, Pinto-Gouveia, & Salvador, 1998). Moreover, self-reports are probably the most valid method to assess anxiety symptoms

during adolescence as youth have been shown to be more accurate sources of information than parents and teachers regarding information about their inner states (Di Bartolo, Albano, Barlow, & Heimberg, 1998).

A second limitation is that the sample consisted exclusively of adolescents in schools, and future studies can replicate the study with clinical populations. It would be interesting to test whether the disconnection/rejection schema domain plays a significant role in the prediction of cognitive processes in clinically socially anxious adolescents, as the schemas of this domain could be more probably activated in clinical samples. Moreover, the use of clinical samples would allow examining whether the principles of Schema Therapy are beneficial for the treatment of socially anxious adolescents. In particular, the results of the present study suggest that the schemas belonging to the other-directedness (i.e., subjugation and approval-seeking) should be the focus of interventions.

Finally, the study included measures of anxious thoughts that manifest three types of cognitive biases characteristic of socially anxious individuals according to the main cognitive models of SAD (e.g., Rapee & Heimberg, 1997; Stopa & Clark, 2000; Weeks et al., 2005; Wells, 1997). Nonetheless, further research is required to assess also attentional biases as a mediating variable between schemas and symptoms of social anxiety. This could be tested experimentally by examining these biases in adolescents with specific schemas. Furthermore, as part of these attentional biases, socially anxious individuals often adopt an "observer" perspective and focus their attention on how they believe that they are being perceived by others (Clark, 2001). When they look back on social situations, they remember them from this perspective (Wells, Clark, & Ahmad, 1998). It would be interesting to examine whether early maladaptive schemas contribute to shape these mental representations.

Despite these limitations, the study has several strengths. This is the first multiwave longitudinal study to examine cross-lagged relationships among early maladaptive schemas, anxious automatic thoughts, and social anxiety symptoms. The design had 3 time points, the indirect paths were formally tested via bootstrapping, and temporal precedence of both the independent and mediating variables was established, which contributes to demonstrating the mediational paths hypothesized in the study. Furthermore, the study was conducted with a representative sample of adolescents in the community, which gives external validity to the results. As mentioned, the majority of the research on cognitive biases in SAD has been conducted in adult populations and it is important to identify the cognitive mechanisms that contribute to the development and maintenance of social anxiety in adolescence, when the average age of onset for this disorder occurs. Finally, the findings have important implications for theory, as they are consistent with the hypothesis that cognitions are hierarchically arranged so that deeper schemas guide ongoing processing operations, and that the results of these operations contribute to worsening schemas (Beck, 1976; Dodge, Coie, & Lynam, 2006).

5. Conclusions

To sum up, findings of this study have theoretical implications as they contribute to demonstrate that deeper schemas predict more surface-level anxious thoughts and these in turn perpetuate schemas. They also suggest that early maladaptive schemas of the other-directedness domain play a key role in the development and maintenance of social anxiety. Still, replication of these results from a sample with diagnoses of SAD would help to confirm whether these findings apply to adolescents with clinically significant problems and to evaluate the clinical implications for interventions.

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