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ORIGINAL PAPER

Efficient Screening for Impairments in Peer Functioning Among Mid-to-Late Adolescents Receiving Clinical Assessments for Social Anxiety

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Abstract

Background   Impairments in peer relations comprise a core feature of social anxiety, particularly among adolescents. Yet, these impairments may also stem from concerns that commonly co-occur with social anxiety, namely depressive symptoms and attention-deficit/hyperactivity disorder (ADHD) symptoms.

Objective   Although peer-related impairments spike during adolescence, we know relatively little about efficiently screening for peer-related impairments that specifically index those impairments relevant to adolescent social anxiety.

Method   We recruited 89 adolescents ($M = 14.5$ years, 64% female, 65.1% African American) who varied on evaluation-seeking status (30 evaluation-seeking; 59 community control). On a preliminary phone screen, parents provided reports on three peer-related impairment items identified in prior work as particularly discriminative: number of friends, trouble making friends, and trouble keeping friends. Parents and adolescents completed survey measures of social anxiety and mental health concerns commonly linked to social anxiety (i.e., depressive symptoms, ADHD symptoms).

Results   Increased peer-related impairments were uniquely related to increased social anxiety, controlling for depressive symptoms and ADHD symptoms. Increased peer-related impairments also predicted increased risk for being above the clinical cut score on measures of social anxiety, depressive symptoms, and ADHD symptoms. The number of peer-related impairments significantly distinguished adolescents on evaluation-seeking status.

Conclusions   Using a short list of three items assessing peer-related impairments (number of friends, trouble making friends, and trouble keeping friends) one can efficiently screen for peer-related impairments of specific relevance to adolescent social anxiety. These findings have important implications for leveraging efficient, evidence-based screening devices when clinically assessing adolescent social anxiety, particularly in low-resource mental health settings.

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Keywords Adolescents · Assessment · Impairment · Peer relations · Social anxiety

Introduction

Social anxiety disorder is one of the most common mental health disorders in the United States, with a 12-months prevalence rate of 7.4% and a lifetime rate of 13% (Kessler et al. 2012). Individuals experiencing social anxiety disorder often display intense fears of social situations, such as those involving the potential for negative evaluation or rejection by others (American Psychiatric Association [APA] 2013). These intense fears often significantly impair social, educational, and/or school or work functioning (Kessler et al. 2005). Among at-risk groups, adolescents display greater vulnerability to developing social anxiety, as evidenced by a spike in social anxiety levels during adolescence relative to earlier and later developmental periods (Grant et al. 2005). Thus, adolescence is a key period for not only understanding core features of social anxiety, but also developing procedures for efficient screening of these features.

A key issue with understanding adolescent social anxiety involves understanding how core features of social anxiety manifest during adolescence. This knowledge informs applied research and clinical work (e.g., screening and treatment planning), as well as basic research in developmental psychopathology (for a review, see Silverman and Ollendick 2005). Along these lines, a core feature of social anxiety among adolescents involves fear and avoidance of social interactions with unfamiliar peers (Alfano and Beidel 2011). In fact, maladaptive reactions to interacting with unfamiliar peers comprise a core target for assessing and treating social anxiety concerns among adolescents (Beidel et al. 2010; Glenn et al. 2018). In particular, evidence-based techniques for treating the condition focus on reducing the social skills deficits that are thought to both contribute to and result from fear and avoidance of peer interactions (Beidel et al. 2000). Not surprisingly, in the absence of treatment, those experiencing social anxiety concerns display significant impairments in social functioning, including impairments in the development of normative peer relationships such as making new friends in the transition from middle school to high school (see APA 2013).

In light of the importance of understanding peer-related impairments among adolescents who experience social anxiety concerns, a key consideration involves the broad impacts that impairments in peer functioning can have on adolescents in general, and those who experience mental health concerns in particular. Among adolescents, the inability to form normative peer relationships is particularly problematic given the increased importance of peer group acceptance during the mid-to-late adolescent period (La Greca and Lopez 1998). Forming and maintaining normative peer relationships is essential for increasing independence from parents, developing healthy romantic relationships, and coping with stress (Ingersoll 1989). Not surprisingly, both maladaptive peer relationships and the behaviors thought to contribute to these maladaptive relationships (e.g., social skills deficits) also manifest in the context of mental health domains beyond social anxiety. Particularly relevant to adolescent social anxiety, depressive symptoms and attention-deficit/hyperactivity disorder (ADHD) symptoms are two domains that both commonly co-occur with social anxiety and often result in the kinds of peer-related impairments described previously (e.g., APA 2013; Silverman and Ollendick 2005). Further, not only does co-occurrence of social anxiety with other mental health concerns point to greater impairments in functioning, but the *quantity* of impairments in functioning (e.g., how many kinds of

peer-related impairments an adolescent experiences) also points to greater risk for mental health concerns (Epkins and Heckler 2011; Jarrett and Ollendick 2008). These realities of adolescents' clinical presentations pose challenges to assessing peer-related impairments specific to social anxiety. Indeed, when delivering clinical services (e.g., assessment, treatment planning, monitoring treatment response) not only is it important to identify functional impairments in need of remediation, but also to demonstrate their *specific links* to the condition targeted for services (Rapee et al. 2012).

Overall, social anxiety may substantially impair peer functioning among adolescents. Yet, other domains that commonly co-occur with social anxiety can also result in these same impairments. Thus, it is important to create short screening devices that not only detect peer-related impairments among adolescents, but also show *specificity* in impairments relevant to social anxiety. In this regard, commonly used instruments within evidence-based assessments of adolescent social anxiety may inform the development of such a screening device. Specifically, the Anxiety Disorders Interview Schedule for Children and Adolescents (ADIS-C/A; Silverman and Albano 1996) is the most widely used semi-structured interview designed to assess and diagnose child and adolescent anxiety disorders. Among the components of the interview is an *Interpersonal Relationships Module* that includes items for assessing peer-related impairments.

Recent work leveraged items from the ADIS-C/A Interpersonal Relationships Module to test for peer-related impairments among anxious youth. Specifically, Scharfstein et al. (2011) assessed the interpersonal functioning of children (ages 6–13) with generalized anxiety disorder or social anxiety disorder, and healthy control children with no mental health diagnoses. As part of this study, parents responded to items from the ADIS-C/A that assess for individual differences in peer-related impairments. These items included: (a) *Would you say your child has more friends/fewer friends/same number as most kids?* (response options: more friends, same number of friends, or fewer friends relative to same age peers); (b) *Does your child have a best friend?* (response options: yes or no); (c) *Do you think your child has trouble making friends?* (response options: yes or no); (d) *Once your child has made friends, do you think he/she has trouble keeping them?* (response options: yes or no); and (e) *Is your child in any club or group or does he/she play on any sports team?* (response options: yes or no).

Among these five items, Scharfstein et al. (2011) identified two items that distinguished the diagnostic groups from the control group, namely the items that assess number of friends relative to other children, and difficulty making friends. Children diagnosed with either generalized anxiety disorder or social anxiety disorder differed from the control group on the "number of friends" item, but only children diagnosed with social anxiety disorder differed from the control group on the "difficulty making friends" item. Further, the "difficulty keeping friends" item did not discriminate youth on diagnostic status (e.g., Generalized Anxiety Disorder vs. Social Anxiety Disorder vs. healthy control). Yet, the study's low sample size (i.e., 18 youths per group) likely played a role in the non-significant χ^2 statistic for the test comparing these groups, which in Scharfstein et al. (2011) was nonetheless relatively high, $\chi^2(2) = 4.27$. Thus, we used these three items to construct a screening measure of peer-related impairments relevant to understanding adolescent social anxiety.

Purpose and Hypotheses

The purpose of this study was to test the ability of three items from the ADIS-C/A Interpersonal Relationships Module to efficiently detect peer-related impairments (i.e., number

of friends, trouble making friends, and trouble keeping friends) among adolescents receiving an evaluation for social anxiety and related mental health concerns. Indeed, it remains an empirical question whether these items allow one to detect peer-related impairments among mid-to-late adolescents receiving evaluations for social anxiety. Determining whether these items can be used for this purpose is important given the ubiquity of peer-related impairments among socially anxious individuals within this developmental period. A short screening method for detecting peer-related impairments among adolescents would facilitate the detection of at-risk individuals, even within resource-limited clinic settings, which often face difficulties with leveraging evidence-based assessment techniques (see Beidas et al. 2015).

We tested three hypotheses in a sample of adolescents whose parents contacted our laboratory to participate in either a clinical evaluation of their adolescent's social anxiety (*Evaluation-Seeking Adolescents*) or a non-clinic study about adolescent-parent relationships (*Community Control Adolescents*). First, we expected number of peer-related impairments to distinguish adolescents on their evaluation-seeking status (i.e., Evaluation-Seeking > Community Control). Further, as mentioned previously adolescents who experience social anxiety and related social functioning deficits tend to experience other mental health concerns that also result in substantial deficits in social functioning, namely depressive symptoms and ADHD symptoms. At the same time, co-occurrence of multiple mental health concerns tends to point to greater functional impairments. Thus, it is possible that greater peer-related impairments point specifically to greater social anxiety concerns, but also that greater numbers of co-occurring mental health concerns relate to greater numbers of peer-related impairments. We tested these two possibilities with our second and third hypotheses. Specifically, we hypothesized that greater peer-related impairments would relate to greater levels of adolescent social anxiety, depressive symptoms, and ADHD symptoms, but that when jointly considered social anxiety would uniquely relate to peer-related impairments. Additionally, we expected our screener for peer-related impairments to display criterion-related validity in relation to identifying adolescents who displayed clinically elevated mental health concerns. Specifically, we expected increased peer-related impairments to predict increased risk in adolescents scoring above established clinical thresholds on measures of social anxiety, depressive symptoms, and ADHD symptoms.

Method

Participants

We recruited a sample of 96 14–15-years-old adolescents and their parents from the areas of Maryland, Washington, D.C., and Northern Virginia. We began collecting peer-related impairment data with the eighth family in our sample. Thus, all data reported below reflect that which we collected from the 89 families with complete data. Families recruited for this study had to (a) be able to speak English; (b) have a 14–15-years-old adolescent who could read at or above their grade-level, did not have any learning or developmental disabilities, and had not received any cognitive behavioral therapy for anxiety or any other related concerns in the last 3 months before the phone screening; and (c) understand the consent/assent process. Parents of Evaluation-Seeking Adolescents were given feedback on their adolescents' social anxiety, mood levels, and/or ADHD symptoms, with a focus on clinically significant levels, and referrals to services that could provide further assistance for

any of these concerns. Parents of Community Control Adolescents were not given feedback about their adolescents' mental health. Prior work suggests that this recruitment approach results in Evaluation-Seeking and Community Control Adolescent groups that can be differentiated in levels of adolescent social anxiety as well as resting physiology (e.g., De Los Reyes et al. 2012; Deros et al. 2018; Thomas et al. 2012).

Within the total sample, we recruited 30 Evaluation-Seeking Adolescents and 59 Community Control Adolescents. These 89 adolescents had a mean age of 14.50 years ($SD = 0.50$) and included 57 female and 32 male participants. The participating parent identified the adolescent's racial/ethnic background as African American or Black (65.1%); White, Caucasian American, or European (29.9%); Asian American or Asian (5.6%); Hispanic or Latino/a (Spanish) (8.1%); American Indian (1.4%); or "Other" (9.6%). Ethnic/racial demographic rates total above 100% because parents could select multiple response options. As in prior work (e.g., Augenstein et al. 2016; De Los Reyes et al. 2012; Deros et al. 2018; Rausch et al. 2017; Thomas et al. 2012), parents provided data about weekly family income using a survey that included response options on a 10-point Likert-type scale in $100 increments (e.g., $101–$200 per week). On this scale, parents reported that 28 of the families earned $500 or less per week, 20 earned between $501 and $900 per week, and 41 earned more than $901 in income per week.

Parents were the adolescent's biological mother/father (94.4%), adoptive mothers/fathers (3.4%), stepmothers/fathers (1.1%), or the primary caregiver's significant other (1.1%). Parents reported their marital status as currently married (42.7%), never married (24.7%), divorced from a significant other (15.7%), separated from a significant other (11.2%), living with a significant other (4.5%), or widowed (1.1%). Our sample's demographic figures are consistent with economic and ethnic data for the geographic area of recruitment (U.S. Census Bureau 2016).

For multiple aims tested below, we used an analytic approach involving examinations of the Evaluation-Seeking and Community Control groups as one pooled sample. In support of this approach, prior work demonstrates that these Evaluation-Seeking and Community Control groups are comparable or non-significantly different on the demographic characteristics reported previously (see Deros et al. 2018; Karp et al. 2018; Keeley et al. 2018; Rausch et al. 2017). Demographic data for the two groups are available upon request from the corresponding author.

Procedure

All procedures were approved by the Institutional Review Board of the large Mid-Atlantic university at which we conducted the study. Participants for the study were recruited through a variety of strategies, including advertisements posted online (e.g., Craigslist, laboratory website), on public transportation servicing the university and community, and on local advertisement boards. We also recruited through the offices of local clinicians serving our targeted demographic. Parents completed an initial screen for eligibility over the telephone and were subsequently scheduled to complete an assessment in our laboratory offices. After providing parental consent and adolescent assent for participation in the study, dyads participated in an in-person assessment and independently completed a counterbalanced battery of survey measures. Dyads completed survey measures on computers using Qualtrics Survey data collection software. Families received $100 in monetary compensation (i.e., $50 to the parent, $50 to the adolescent), and were debriefed on study activities.

Screening Items for Peer-Related Impairments

During the initial phone screen completed by parents and described previously, research personnel administered three items from the Interpersonal Relationships Module of the ADIS-C/A (Silverman and Albano 1996), in line with prior work (Scharfstein et al. 2011): (1) *Would you say that your child has more friends/fewer friends/same number as most kids?*; (2) *Do you think your child has trouble making friends?* (yes or no); (3) *Once your child has made friends, do you think he/she has trouble keeping them?* (yes or no). Research personnel recorded parents' ratings for each of these three items. Importantly, personnel did not use these items to determine study eligibility; we collected these data strictly for informational purposes. For the analyses reported below, we grouped adolescents in terms of the number of items for which parents positively endorsed peer-related impairments (i.e., response for "number of friends" item: "fewer friends"; response for "making friends" item: "yes"; response for "keeping friends" item: "yes"). We allocated adolescents into one of three groups: "0" peer-related impairments ($n = 42$); "1" peer-related impairment ($n = 19$); or "2 or more" peer-related impairments ($n = 28$). We considered separately examining those adolescents whose parents endorsed 2 versus 3 impairments but decided against this given the small number of adolescents whose parents endorsed 3 impairments ($n = 9$).

Survey Measures

We administered a multi-informant survey battery to address our research questions. As part of this battery, parents completed a demographics form to collect information about the adolescent, parent, and family, as described previously.

Adolescent and Parent Survey Measures

Adolescents and parents completed several survey measures of adolescent psychosocial functioning. Adolescents completed self-reports on all survey measures described below, and parents completed a modified version of these surveys to report on adolescent functioning, consistent with prior work (e.g., "I" for an adolescent self-report measure of their mental health concerns was modified to read, "My child," for the parent report version of that same measure; see Augenstein et al. 2016; De Los Reyes et al. 2012, 2013a; Deros et al. 2018; Qasmieh et al. 2018). Table 1 provides the sample internal consistency estimates for all study measures.

Social Anxiety

Adolescents and parents completed the widely used *Social Phobia and Anxiety Inventory for Children* (SPAIC; Beidel et al. 1995), a 26-item measure in which each item describes a social situation and the respondent endorses how often the adolescent feels nervous or scared when encountering such a scenario. The scale used a 3-point Likert-type scale ranging from "0" (Never) to "2" (Always). Greater scores on the SPAIC indicate greater social anxiety. Depending on the aim of the analysis, we examined either SPAIC continuous scores or discrete scores based on established cut scores on this

Table 1 Means (M), standard deviations (SD), and internal consistency (α) estimates of survey measures of adolescents and parents

Variable	M	SD	α
SPAIC			
Adolescent self-report	15.80	10.17	.94
Parent report about adolescent	18.45	11.27	.95
BDI-II			
Adolescent self-report, raw	12.27	10.37	.91
Adolescent self-report, square root	3.18	1.48	
Parent report about adolescent, raw	6.64	7.79	.90
Parent report about adolescent, square root	2.03	1.60	
ASRS-6			
Adolescent self-report, raw	10.86	3.97	.66
Adolescent self-report, clinical	2.51	1.56	
Parent report, raw	10.06	4.96	.81
Parent report, clinical	2.39	1.84	

SPAIC Social Phobia And Anxiety Inventory For Children; *BDI-II* Beck Depression Inventory-II; *ASRS-6* ADHD Self-Report Scale, Six-Item Version

measure to identify clinically elevated social anxiety (i.e., scores of 18 or above; Beidel et al. 1995).

Depressive Symptoms

Adolescents and parents completed a modified version of the Beck Depression Inventory–II (BDI-II; Beck et al. 1996). The BDI-II is a commonly used 21-item measure in assessments of depressive symptoms, and was originally designed to measure "the severity of depression in adults and adolescents aged 13 years and older" (Beck et al. 1996, p. 1). Respondents were asked to rate items describing symptoms of depression on a 4-point scale, with possible score ranges from 0 to 63 and higher scores indicating greater depressive symptoms. In our administration of the BDI-II, we excluded item 9, which assesses for suicidal thoughts and actions, and item 21, which inquires about loss of interest in sex. Consistent with prior work (e.g., Lipton et al. 2014; Rausch et al. 2017; Thomas et al. 2012), we did not administer these two items given the mature nature of the item content and because parents in our studies often decline to consent to having their adolescents respond to items that assess these behaviors. Internal consistency estimates of the 19 items administered nonetheless demonstrated high internal consistency (Table 1). As part of this approach and to ensure comparability with scoring for the full version of the measure (i.e., possible score ranges from 0 to 63), responses for items 9 and 21 were pro-rated or estimated for each participant, based on their mean score for the 19 remaining items. For tests based on discrete scores, we used the established cut score for identifying "mild depressive symptoms" (i.e., scores of 14 or above; Beck et al. 1996). Several studies support use of the BDI-II to assess depressive symptoms among adolescents within the age range of our sample (e.g., Lipton et al. 2014; Rausch et al. 2017; Steer et al. 1998; Thomas et al. 2012).

Attention and Hyperactivity Concerns

Adolescents and parents completed the ADHD Self-Report Scale (ASRS) screener (Kessler et al. 2007). This 18-item scale measures inattentiveness and hyperactivity through a 5-point scale ranging from "0" (Never) to "4" (Very often). The ASRS displays acceptable estimates of test–retest reliability (Kessler et al. 2007). For the current study, we administered the first six items of the ASRS (i.e., ASRS-6). Prior work indicates that these six items are most predictive of clinically relevant ADHD symptoms (Kessler et al. 2007), and recent work supports the psychometric properties of these items when administered to adolescents during social anxiety assessments (Keeley et al. 2018). In this study, we examined either ASRS-6 continuous scores or discrete scores based on established cut scores on this measure to identify clinically elevated ADHD symptoms (i.e., scores of 4 symptoms or above in the clinical range; Kessler et al. 2007).

Identifying Adolescents Above Clinical Cut Scores on Measures of Social Anxiety, Depressive Symptoms, and/or ADHD Symptoms

For one of our hypotheses, we were interested in testing the relation between adolescents' peer-related impairments and the extent to which adolescents scored above the clinical cut scores of our mental health surveys (i.e., SPAIC, BDI-II, ASRS-6). We calculated this number separately by each informant. For example, for adolescent-reported surveys, the possible range of measures that could be above the clinical cut score was 0–3 (i.e., 3 = above the clinical cut score on SPAIC, BDI-II, and ASRS-6). As reported in Table 2 and using the same grouping strategy we leveraged to measure adolescents' peer-related impairments, we grouped adolescents in terms of the number of adolescent- and parent-reported measures for which they scored above the clinical cut score: "0" measures, "1" measure, or "2 or more" measures. As with peer-related impairments, relatively few adolescents scored above the clinical cut score on all three measures (adolescent report: $n = 9$; parent report: $n = 9$). Thus, we grouped together those adolescents who scored above the clinical cut score on 2 or more measures. We created one grouping based on adolescent report and another based on parent report.

Data-Analytic Plan

Links to Evaluation-Seeking Status

To test the relations between adolescents' peer-related impairments and evaluation-seeking status, we computed a series of χ^2 statistics. We computed χ^2 statistics for the relation between number of peer-related impairments and evaluation-seeking status, and then separate χ^2 statistics for each of the peer-related impairment items.

Convergent Validity

As part of our analytic plan, we tested the links between adolescents' peer-related impairments and their levels of social anxiety, depressive symptoms, and ADHD symptoms. These tests involved examining adolescents' scores on both self- and parent-reported instruments. These reports were essentially non-independent observations given that

Table 2 Frequencies (N) and percentages (%) of adolescents above clinical cut scores based on survey measures of adolescents and parents

Variable	N above clinical cut score	% above clinical cut score
SPAIC		
Adolescent self-report	30	33.7
Parent report about adolescent	44	49.4
BDI-II		
Adolescent self-report	27	30.3
Parent report about adolescent	13	14.6
ASRS-6		
Adolescent self-report	24	27
Parent report about adolescent	33	37.1
Above clinical cut score, adolescent self-report		
SPAIC and BDI-II	17	19.1
SPAIC and ASRS-6	13	14.6
BDI-II and ASRS-6	13	14.6
SPAIC, BDI-II, and ASRS-6	9	10.1
0 measures above clinical cut score	42	47.2
1 measure above clinical cut score	22	24.7
2 or more measures above clinical cut score	25	28.1
Above clinical cut score, parent report		
SPAIC and BDI-II	12	13.5
SPAIC and ASRS-6	22	24.7
BDI-II and ASRS-6	10	11.2
SPAIC, BDI-II, and ASRS-6	9	10.1
0 measures above clinical cut score	34	38.2
1 measure above clinical cut score	29	32.6
2 or more measures above clinical cut score	26	29.2

SPAIC Social Phobia and Anxiety Inventory For Children; *BDI-II* Beck Depression Inventory-II; *ASRS-6* ADHD Self-Report Scale, Six-Item Version

data were nested within families (i.e., both adolescent and parent in each family provided separate reports). That is, these reports displayed correlated data structures and violated assumptions of data independence underlying the general linear model (GLM). Therefore, we leveraged generalized estimating equations (GEE) to address this aim. GEE is an extension of the GLM that assumes correlated observations of dependent variables (Hanley et al. 2003).

For these GEE models, we assumed a normal distribution of the dependent variables, and used an identity link function with an unstructured correlation matrix given the small number of dependent variables. We ran three models (i.e., one each for social anxiety, depressive symptoms, and ADHD symptoms) with adolescents' mental health concerns as a nested, repeated-measures (i.e., within adolescent-parent dyad) dependent variable and modeled the dependent variable as a function of two factors. We entered a within-subjects informant factor (coded parent, then adolescent), and a between-subjects Peer-Related Impairments factor (coded in successive order of "0," "1," and "2 or more" impairments).

In the presence of omnibus effects for our independent variables, we conducted follow-up univariate contrasts for three key effects: (a) mean differences between informants (i.e., parent vs. adolescent), (b) mean differences between adolescents displaying 2 or more peer-related impairments versus 0 peer-related impairments, and (c) mean differences between adolescents displaying 1 peer-related impairment versus 0 peer-related impairments.

With regard to the convergent validity tests described previously, we were also interested in testing the specificity of these effects with respect to adolescent social anxiety. Thus, we ran a second set of GEE models. In each of these models, we examined the links between peer-related impairments and one of the psychopathology domains served as the dependent variable (i.e., one model each for social anxiety, depressive symptoms, and ADHD symptoms). However, in each of these models we entered the other two psychopathology domains as covariates. For example, when social anxiety served as the dependent variable, we entered depressive symptoms and ADHD symptoms as covariates.

Criterion-Related Validity: Clinical Cut Scores

As a final aim, we were interested in testing the link between adolescents' peer-related impairments and risk for displaying scores above the clinical cut scores of our measures of social anxiety, depressive symptoms, and/or ADHD symptoms. Here too, we leveraged GEE for addressing this aim. However, given the ordinal nature of the dependent variables (i.e., elevated on 0, 1, or 2 or more measures), we constructed these GEE models with assumptions that differed from the models described previously. Specifically, we assumed a multinomial distribution of the dependent variables, and used a cumulative logit link function with an unstructured correlation matrix given the small number of dependent variables. We ran one model with number of measures above the clinical cut score as a nested, repeated-measures (i.e., within adolescent-parent dyad) dependent variable and modeled the dependent variable as a function of two factors. We entered a within-subjects informant factor (coded parent, then adolescent), and a between-subjects Peer-Related Impairments factor (coded in successive order of "0," "1," and "2 or more" impairments). In the presence of omnibus effects for our independent variables, we examined the parameter estimates that tested for differences in risk between: (a) informants (i.e., parent vs. adolescent), (b) adolescents displaying 2 or more peer-related impairments versus 0 peer-related impairments, and (c) adolescents displaying 1 peer-related impairment versus 0 peer-related impairments.

For all tests described in our analytic plan, we inferred the statistical significance of findings relative to a p value threshold of $< .05$.

Results

Preliminary Analyses

We examined distributions of all of our continuous measures to detect deviations from normality (i.e., skewness and kurtosis). All measures with the exception of the BDI-II fell within acceptable thresholds for skewness and kurtosis (i.e., skewness/kurtosis in range of ± 2.0). To address concerns with skewness and kurtosis of BDI-II reports, we applied a square root transformation to adolescent and parent reports on this measure. This transformation brought BDI-II scores within acceptable levels of skewness and kurtosis.

Consequently, we used these square root-transformed scores in all analyses reported below. In Table 1, we report means, standard deviations, and internal consistency estimates for all survey measures.

In Table 2, we report frequencies and percentages of participants who scored above cut scores for our measures of social anxiety (SPAIC), depressive symptoms (BDI-II), and ADHD symptoms (ASRS-6). An important observation is that among those adolescents who displayed elevations above cut scores on these measures, the grand majority of these adolescents displayed such elevations on our social anxiety measure *and* another psycho-pathology measure (i.e., depressive symptoms, ADHD symptoms, or both). That is, relatively few adolescents in the sample (i.e., 4 based on adolescent report, 1 based on parent report) displayed elevations in depressive symptoms and ADHD symptoms *but not also* social anxiety.

Links to Evaluation-Seeking Status

We examined whether the number of adolescents' peer-related impairments distinguished them on evaluation-seeking status. We observed a significant effect of evaluation-seeking status, χ^2 (2) = 41.00; Cramer's $V = .68$; $p < .001$. Parents of Community Control Adolescents endorsed 0 peer-related impairments at a high frequency (40/59 Community Control parents; 67.8%), and 2 or more peer-related impairments at a relatively low frequency (6/59 Community Control parents; 10.2%). Conversely, parents of Evaluation-Seeking Adolescents endorsed 0 peer-related impairments at a low frequency (2/30 Evaluation-Seeking parents; 6.7%) and 2 or more peer-related impairments at a relatively high frequency (22/30 Evaluation-Seeking parents; 73.3%).

As an additional check on the links between these peer-related impairment items and evaluation-seeking status, we conducted separate tests for each of the three peer-related impairment items. Each item also significantly distinguished adolescents on evaluation-seeking status (i.e., number of friends [$\chi^2 = 31.83$, Cramer's $V = .60$, $p < .001$]; trouble making friends [$\chi^2 = 27.29$, Cramer's $V = .55$, $p < .001$]; trouble keeping friends [$\chi^2 = 13.02$, Cramer's $V = .38$, $p < .001$]). These item-level effects further support our use of all three of these items and also our decision to create a summary variable using all three items in analyses reported below.

Convergent Validity

In Tables 3, 4, and 5, we report tests of the convergent validity of parent-endorsed peer-related impairments. Two of these three tests (i.e., tests in which the SPAIC and BDI-II served as the criterion variable) revealed a significant effect of inform-ant, such that adolescents reported significantly fewer social anxiety concerns and greater depressive symptom concerns, relative to parents. Controlling for these inform-ant effects, in each of the three tests we observed a significant effect of peer-related impairments. However, the nature of this effect differed, depending on the criterion variable. Specifically, for tests using the SPAIC, adolescents with 2 or more peer-related impairments or 1 peer-related impairment displayed significantly higher SPAIC scores, relative to adolescents with 0 peer-related impairments. In contrast, when the BDI-II and ASRS-6 served as criterion variables, only those adolescents with 2 or more peer-related impairments displayed significantly higher scores relative to the

Table 3 Generalized estimating equation (GEE) predicting survey reports of adolescent social anxiety (SPAIC) as a function of survey informant and number of adolescent peer-related impairments

Factor			Type III Wald χ^2
Main GEE model effects			
Informant			4.10*
Peer-related impairments			20.97***
Variable (contrast)	$b(SE)$	95% Wald confidence interval for b	Wald χ^2
Parameter estimates for factor contrasts			
Informant (adolescent vs. parent)	− 2.65 (1.31)	[− 5.23, − 0.08]	4.10*
Peer-related impairments (2 vs. 0)	9.32 (2.08)	[5.24, 13.40]	20.03***
Peer-related impairments (1 vs. 0)	3.84 (1.88)	[0.15, 7.52]	4.17*
Contrast	M^1 (SE)	M^2 (SE)	Mean difference (SE)
Follow-up factor contrasts for mean estimates			
Informant (adolescent vs. parent)	16.43 (1.10)	19.09 (1.09)	− 2.65 (1.31)*
Peer-related impairments (2 vs. 0)	22.70 (1.83)	13.37 (0.98)	9.32 (2.08)***
Peer-related impairments (1 vs. 0)	17.21 (1.60)	13.37 (0.98)	3.84 (1.88)*

SPAIC Social Phobia and Anxiety Inventory for Children. Factor contrasts based on comparisons of factors in descending order. The informant factor (coded in ascending order) was coded 0=parent and 1=adolescent. The peer-related impairments factor (coded in ascending order) was coded 0=no reported impairments; 1=one reported impairment; and 2=two or more reported impairments; *$p < .05$; **$p < .01$; ***$p < .001$

Table 4 Generalized estimating equation (GEE) predicting survey reports of adolescent depressive symptoms (BDI-II) as a function of survey informant and number of adolescent peer-related impairments

Factor			Type III Wald χ^2
Main GEE model effects			
Informant			37.96***
Peer-related impairments			8.65*
Variable (contrast)	$b(SE)$	95% Wald confidence interval for b	Wald χ^2
Parameter estimates for factor contrasts			
Informant (adolescent vs. parent)	1.15 (0.18)	[0.78, 1.51]	37.96***
Peer-related impairments (2 vs. 0)	0.91 (0.31)	[0.29, 1.53]	8.32**
Peer-related impairments (1 vs. 0)	0.41 (0.29)	[− 0.15, 0.98]	2.05
Contrast	M^1 (SE)	M^2 (SE)	Mean difference (SE)
Follow-up factor contrasts for mean estimates			
Informant (adolescent vs. parent)	3.24 (0.15)	2.09 (0.17)	1.15 (0.18)***
Peer-related impairments (2 vs. 0)	3.14 (0.27)	2.22 (0.16)	0.91 (0.31)**
Peer-related impairments (1 vs. 0)	2.64 (0.23)	2.22 (0.16)	0.41 (0.29)

BDI-II Beck Depression Inventory-II. Factor contrasts based on comparisons of factors in descending order. The informant factor (coded in ascending order) was coded 0=parent and 1=adolescent. The peer-related impairments factor (coded in ascending order) was coded 0=no reported impairments; 1=one reported impairment; and 2=two or more reported impairments; *$p < .05$; **$p < .01$; ***$p < .001$

Table 5 Generalized estimating equation (GEE) predicting survey reports of adolescent ADHD symptoms (ASRS-6) as a function of survey informant and number of adolescent peer-related impairments

Factor			Type III Wald χ^2
Main GEE model effects			
Informant			1.68
Peer-related impairments			7.42*
Variable (contrast)	$b(SE)$	95% Wald confidence interval for b	Wald χ^2
Parameter estimates for factor contrasts			
Informant (adolescent vs. parent)	0.80 (0.62)	[−0.41, 2.01]	1.68
Peer-related impairments (2 vs. 0)	2.10 (0.77)	[0.58, 3.63]	7.34**
Peer-related impairments (1 vs. 0)	0.99 (0.97)	[−0.92, 2.90]	1.03
Contrast	M^1 (SE)	M^2 (SE)	Mean difference (SE)
Follow-up factor contrasts for mean estimates			
Informant (adolescent vs. parent)	11.02 (0.45)	10.22 (0.53)	0.80 (0.62)
Peer-related impairments (2 vs. 0)	11.69 (0.63)	9.59 (0.45)	2.10 (0.77)**
Peer-related impairments (1 vs. 0)	10.58 (0.86)	9.59 (0.45)	0.99 (0.97)

ASRS-6 ADHD Self-Report Scale, Six-Item Version. Factor contrasts based on comparisons of factors in descending order. The informant factor (coded in ascending order) was coded 0 = parent and 1 = adolescent. The peer-related impairments factor (coded in ascending order) was coded 0 = no reported impairments; 1 = one reported impairment; and 2 = two or more reported impairments; *$p < .05$; **$p < .01$; ***$p < .001$

adolescents with 0 peer-related impairments. Overall, parent-endorsed peer-related impairments distinguished adolescents on levels of social anxiety, depressive symptoms, and ADHD symptoms.

As mentioned previously, we also tested for the specificity of these effects with a second set of GEE models that controlled for the two other psychopathology domains not serving as dependent variables. In Table 6 we report these tests when SPAIC scores served as the dependent variable, and the BDI-II and ASRS-6 served as covariates. Here too we observed a significant effect of informant in the same direction as that which we reported in Table 3 (i.e., adolescents reporting fewer social anxiety concerns, relative to parents). Controlling for this informant effect, we also observed a significant effect of peer-related impairments. However, unlike the effects reported in Table 3, the only significant contrast that emerged indicated that adolescents with 2 or more peer-related impairments displayed significantly higher SPAIC scores relative to the adolescents with 0 peer-related impairments.

Importantly, we observed null effects for the other two models. Specifically, when SPAIC and BDI-II scores were entered as covariates, we observed a null effect of peer-related impairments on ASRS-6 scores, Type III Wald $\chi^2 = 0.18$; $p = .91$. Similarly, when SPAIC and ASRS-6 scores were entered as covariates, we observed a null effect of peer-related impairments on BDI-II scores, Type III Wald $\chi^2 = 0.43$; $p = .80$. Thus, these secondary analyses indicate that in terms of relations between peer-related impairments and continuous indicators of psychopathology, our convergent validity effects appeared specific to adolescent social anxiety.

Table 6 Generalized estimating equation (GEE) predicting survey reports of adolescent social anxiety (SPAIC) as a function of survey informant and number of adolescent peer-related impairments, whilst controlling for adolescent ADHD symptoms (ASRS) and depressive symptoms (BDI-II)

Factor/covariate			Type III Wald χ^2
Main GEE model effects			
Informant			29.41***`
ASRS			8.77**
BDI-II			30.67***
Peer-related impairments			9.32**
Variable (contrasts for factors)	$b(SE)$	95% Wald confidence interval for b	Wald χ^2
Parameter estimates for factor contrasts/covariates			
Informant (adolescent vs. parent)	−6.35 (1.17)	[−8.64, −4.05]	29.41***
ASRS	0.48 (0.16)	[0.16, 0.79]	8.77**
BDI-II	2.88 (0.52)	[1.86, 3.90]	30.67***
Peer-related impairments (2 vs. 0)	5.69 (1.87)	[2.02, 9.37]	9.22**
Peer-related impairments (1 vs. 0)	2.17 (1.88)	[−1.52, 5.85]	1.33
Contrast	M^1 (SE)	M^2 (SE)	Mean difference (SE)
Follow-up factor contrasts for mean estimates			
Informant (adolescent vs. parent)	14.32 (0.97)	20.67 (1.01)	−6.35 (1.17)***
Peer-related impairments (2 vs. 0)	20.57 (1.54)	14.87 (0.96)	5.69 (1.87)**
Peer-related impairments (1 vs. 0)	17.04 (1.62)	14.87 (0.96)	2.16 (1.88)

SPAIC Social Phobia and Anxiety Inventory for Children. *ASRS-6* ADHD Self-Report Scale, Six-Item Version. *BDI-II* Beck Depression Inventory-II. Factor contrasts based on comparisons of factors in descending order. The informant factor (coded in ascending order) was coded 0 = parent and 1 = adolescent. The peer-related impairments factor (coded in ascending order) was coded 0 = no reported impairments; 1 = one reported impairment; and 2 = two or more reported impairments; *$p < .05$; **$p < .01$; ***$p < .001$

Table 7 Generalized estimating equation (GEE) predicting survey-reported scores above clinical cut scores as a Function of survey informant and number of adolescent peer-related impairments

Factor				Type III Wald χ^2
Main GEE model effects				
Informant				0.75
Peer-related impairments				13.72**
Variable (contrast)	$b(SE)$	95% Wald confidence interval for b	Wald χ^2	Odds ratio
Parameter estimates for factor contrasts				
Informant (adolescent vs. parent)	−0.21 (0.24)	[−0.69, 0.27]	0.75	0.81
Peer-related impairments (2 vs. 0)	1.30 (0.36)	[0.60, 2.00]	13.20***	3.68
Peer-related impairments (1 vs. 0)	0.87 (0.42)	[0.05, 1.69]	4.34*	2.39

The dependent variable (i.e., number of survey-reported scores above clinical cut scores; coded in ascending order) was coded 0 = no scores above the clinical cut score; 1 = one score above the clinical cut score; and 2 = two or more scores above the clinical cut score). Factor contrasts based on comparisons of factors in descending order. The informant factor (coded in ascending order) was coded 0 = parent and 1 = adolescent. The peer-related impairments factor (coded in ascending order) was coded 0 = no reported impairments; 1 = one reported impairment; and 2 = two or more reported impairments; *$p < .05$; **$p < .01$; ***$p < .001$

Criterion-Related Validity: Clinical Cut Scores

In Table 7, we report tests of the criterion-related validity of parent-endorsed peer-related impairments. We observed a significant effect of peer-related impairments. Follow-up contrasts revealed that relative to adolescents with 0 peer-related impairments, adolescents with either 2 or more peer-related impairments or 1 peer-related impairment were significantly more likely to be above the clinical cut scores on the SPAIC, BDI-II, and/or ASRS-6.

Discussion

In this study, we sought to test whether we could use three items from the ADIS-C/A Interpersonal Relationships Module to detect peer-related impairments in a mixed Evaluation-Seeking/Community sample of adolescents. We observed four findings. First, the number of peer-related impairments distinguished adolescents on their evaluation-seeking status, such that Evaluation-Seeking Adolescents were more likely than Community Control adolescents to display 2 or more peer-related impairments. Second, our screener displayed convergent validity, such that greater peer-related impairments among adolescents related to greater levels of adolescent social anxiety, depressive symptoms, and ADHD symptoms. Third, our convergent validity findings were specific to social anxiety, such that relations between peer-related impairments and social anxiety were robust to controlling for depressive symptoms and ADHD symptoms, but relations between peer-related impairments and both depressive symptoms and ADHD symptoms were no longer significant when controlling for social anxiety. Fourth, our screener for peer-related impairments displayed criterion-related validity, such that greater peer-related impairments predicted greater risk in adolescents scoring above established clinical thresholds on our measures of social anxiety, depressive symptoms, and ADHD symptoms. Overall, our findings support the validity of using items from the ADIS-C/A Interpersonal Relationships Module to detect peer-related impairments among adolescents receiving a clinical assessment for social anxiety and related concerns. At the same time, these findings point to the importance of clinical assessments for social anxiety including both measures of peer-related impairments and measures of mental health domains germane to both these impairments and social anxiety (i.e., depressive symptoms and ADHD symptoms). Indeed, it is in taking measures of these other mental health domains into account that allows for careful tests of the specificity of peer-related impairments to social anxiety.

Further, our findings inform important directions for future research. As mentioned previously, we know little about whether short screening devices can validly detect the kinds of peer-related impairments linked to domains of adolescent mental health for which peer difficulties are often a key associated feature (e.g., social anxiety, depression, and ADHD). Our study identified a short list of items that can be delivered even in low-resource environments that often do not have the ability to administer evidence-based assessments (for a review, see Beidas et al. 2015). Several questions merit further study. To what extent do these same items predict treatment response among adolescents? Further, although we observed specificity in links between peer-related impairments and social anxiety, these findings might stem from social anxiety being the primary domain sought out for clinical evaluation in our sample. It remains to be seen if these same

effects manifest for identifying relations between peer-related impairments and adolescent social anxiety within clinical circumstances in which social anxiety presents secondary to another mental health concern (e.g., depression, ADHD, autism spectrum).

Four limitations of this study warrant comment. Consistent with prior work (Scharfstein et al. 2011), we only asked the parent to provide reports about adolescents' peer-related impairments. However, it is quite likely that adolescents provide reports about these impairments that differ from those of parents, in light of prior work documenting low correspondence between reports on adolescent mental health and associated impairments (e.g., De Los Reyes and Kazdin 2006; De Los Reyes et al. 2013b, 2015). Future research ought to examine whether our findings generalize to reports from adolescents about their own peer-related impairments. This information may be especially important when assessing peer relations for adolescents, relative to younger children, considering adolescents have increased autonomy from parents. Thus, an adolescent's self-report may contribute incrementally valuable data about their own peer functioning.

Second, we gathered data on the three peer-related impairment items via a phone screen and thus outside of the normal procedure for gathering reports of these items (e.g., administration of the entire ADIS-C/A). Although we were able to find support for the validity of these items as a screening tool, we only administered these three items to participants, and not the entire ADIS-C/A. Thus, we encourage future research on whether our findings generalize to use of these items when administered as part of the full ADIS-C/A.

Third and related to our second limitation, we used three of the five ADIS-C/A items for assessing peer-related impairments. As mentioned previously, each of these items individually distinguished adolescents on evaluation-seeking status, and thus there was support in this sample for use of these three items to efficiently screen for peer-related impairments relevant to social anxiety. At the same time, this study did not leverage two of the five ADIS-C/A items (i.e., *Does your child have a best friend?*; *Is your child in any club or group or does he/she play on any sports team?*). We did not use these items in light of their lack of ability to distinguish diagnostic groups in Scharfstein et al. (2011). However, Scharfstein et al. (2011) addressed their aims in a sample of youth aged 6–13 years. These two items may have relevance for adolescents, and particular relevance for adolescents experiencing social anxiety. Thus, we encourage future research on whether the two ADIS-C/A peer-related impairment items we did not use in our study provide incrementally valuable data in screening for peer-related impairments relevant to adolescent social anxiety.

Fourth, this study only relied on adolescent and parent reports on survey measures of adolescent mental health to test the validity of this peer-related impairment screener. Prior work suggests that adolescents who experience peer-related impairments are quite likely to display elevated levels of risk factors for adolescent mental health, including social skills deficits (e.g., Alfano and Beidel 2011). Thus, we encourage future research that tests the validity of these peer-related impairment items using validity indicators beyond those obtained from survey data (e.g., observed social skills during social interactions with unfamiliar peers).

Adolescents at risk for mental health concerns often display significant impairments in peer functioning, and yet few measures exist for rapid screening of these impairments. Our study identified three items that assess adolescents' peer-related impairments that are particularly relevant for assessing social anxiety, even when taking into account commonly co-occurring domains that also tend to result in peer-related impairments (i.e., depressive symptoms, ADHD symptoms). Future research ought to examine whether these three peer-related impairment items can be usefully integrated into assessment batteries in

low-resource mental health service settings that are historically under-represented in use and interpretation of evidence-based assessments.

Compliance with Ethical Standards

Conflict of interest Alexis M. Beale, Lauren M. Keeley, Hide Okuno, Sebastian Szollos, Erica Rausch, Bridget A. Makol, Tara M. Augenstein, Melanie F. Lipton, Sarah J. Racz, and Andres De Los Reyes declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the University of Maryland at College Park's Institutional Review Board declaration and its later amendments or comparable ethical standards.

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

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