

# Interpersonal Risk Profiles for Youth Depression: A Person-Centered, Multi-Wave, Longitudinal Study

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**Abstract** Independent lines of research illustrate the benefits of social support and the negative consequences of conflict and emotional neglect across family and peer contexts with regard to depression. However, few studies have simultaneously examined negative and positive interactions across relationships. We sought to address this gap in the literature by utilizing a person-centered approach to a) understand empirical, interpersonal profiles in youth and b) understand how these profiles confer risk for prospective depression. At baseline, 678 youth (380 females; 298 males) 3rd ( $N=208$ ), 6th ( $N=245$ ), and 9th graders ( $N=225$ ) completed self-report measures for self-perceived negative/positive relationships across family and peers, anxiety symptoms, and depressive symptoms in a laboratory setting. Next, youth were called every 3 months for 18 months and completed self-report depressive and anxiety symptom forms. Two-step cluster analyses suggested that children and adolescents fell into one of

three interpersonal clusters, labeled: *Support*, *Conflict*, and *Neglect*. Our analyses supported a convergence model in which the quality of relationship was consistent across peers and family. Furthermore, mixed-level modeling (MLM) findings demonstrated that youth in the Conflict cluster were at increased risk for prospective depressive symptoms, while the Supported and Neglected profiles demonstrated similar symptom levels. Findings were unique to depressive symptoms and consistent across sex and age. Conflict seemed to uniquely confer risk for depression as findings concerning anxiety were not significant. These findings influence our interpersonal conceptualization of depression as well as clinical implications for how to assess and treat depression in youth.

**Keywords** Depression · Family relationships · Peer relationships · Developmental psychopathology

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Extensive research shows that positive relationships with family and friends promote emotional well-being, while negative relationships with family and peers confer risk for depressive symptoms (Brown and Bakken 2011; Epkins and Heckler 2011). One noted shortcoming, however, concerning past research is that different sources (e.g., parents/peers) and quality (e.g., positive/negative) of relationships are often studied in isolation (Sentse et al. 2010), leaving important questions about functioning across contexts unanswered. The present study's goal was to synthesize these interrelated lines of research by creating interpersonal profiles for depression risk across social domains. Using this approach can provide a more comprehensive understanding of interpersonal risk and resilience concerning emotional distress in youth (Henry et al. 2005).

Youths' perceived social support is a commonly used index of positive interactions (i.e., how much they think that their

family and friends will help during times of stress; Lakey and Cronin 2008). Perceived social support is linked to emotional distress through various mechanisms including stress-buffering (Folkman 1984), attachment theory (Brumariu and Kerns 2010), and relational regulation theory (RRT; Lakey and Orehek 2011). Alternatively, as positive interactions with family and peers help protect a child against emotional distress, negative interactions exacerbate these problems. Importantly, negative interactions are not the opposite of social support, but are best conceptualized as distinct aspects of interpersonal functioning (Sentse et al. 2010), such as conflict and emotional neglect with family and friends, both of which relate to depressive symptoms in youth (La Greca and Harrison 2005; Rubin et al. 2004).

To integrate multiple aspects of one's social ecology, researchers have started to examine the collective impact of interpersonal contexts. Although limited in number, these studies represent an important departure from simultaneous examinations of peer and family relationships that artificially pit relationship styles against each other (Brown and Bakken 2011). Buffering hypotheses, which test the interplay between a positive (e.g., parental support) and negative relationship (e.g., peer conflict), and additive approaches, where the numbers of negative/positive relationships are summed, are two examples of these approaches.

With regard to buffering hypotheses, findings have been mixed (i.e., it is unclear whether positive relationships in one domain can protect against negative relationships in another; Gaertner et al. 2010; Hazel et al. 2014; Lansford et al. 2003; Laursen and Mooney 2008; Sentse et al. 2010) across children and adolescent community and school samples. This may be due to methodological limitations (e.g., Gaertner and colleagues (2010) assessed parental behavior while Laursen and Mooney (2008) assessed relationship quality) or due to more theoretical challenges with the buffering hypothesis. For instance, testing the relationship between parents and friendship quality may negate the important influence of siblings (Furman and Buhrmester 1992). As for the additive approach, studies have consistently shown the more negative relationships one has the more they are at risk for emotional distress (Criss et al. 2009; Laursen and Mooney 2008). However, the approach is limited in highlighting how different domains may uniquely impact the development of depression. For instance, is a negative parental relationship equivalent to a negative sibling relationship with regard to depression risk? Also, simply counting up negative relationships provides limited insight into the interplay between different interpersonal domains. Thus, due to limitations in both the buffering and additive approaches, an integrated approach that can identify naturally occurring profiles between peer and family contexts is needed.

*Person-centered* approaches, in contrast to traditional *variable-centered* approaches, group individuals together

based on multiple, shared characteristics (Henry et al. 2005). In other words, rather than focusing on a single variable (e.g., social support), individuals are grouped along theoretically related constructs to identify a finite number of groups across these variables (e.g., social support, neglect, and conflict). Given the various complexities that exist in interpersonal relationships, person-centered approaches are recommended for analyzing differing patterns of negative and positive interactions across social domains (Henry et al. 2005).

To date, a limited body of research has applied person-centered techniques to operationalizing interpersonal vulnerability in youth. Initial investigations utilized traditional clustering techniques to identify unique family (Seidman et al. 1999) and social support networks (Levitt et al. 2005) that confer risk for emotional distress. One limitation of these studies, however, is that subjective cutoff points were used to form groups (e.g., Ward's method) based on a priori hypotheses for the number of profiles that exist. Newer statistical developments allow the number of clusters to be empirically estimated based on objective information criteria (e.g., BIC and AIC; Guidi et al. 2011) using latent profile analyses techniques (DiStefano and Kamphaus 2006) and two-step clustering techniques (Guidi et al. 2011) leading to more unbiased results (DiStefano and Kamphaus 2006; Parra et al. 2006).

Use of these newer techniques helps to identify interpersonal risk profiles to better understand who is at-risk for maladjustment at a young age. For instance, Hubbard et al. (2013) used latent profile analysis to identify an interpersonal profile defined by chronic peer rejection in a middle and late childhood school sample. Lanza et al. (2010) combined interpersonal constructs (e.g., parenting behavior) with intrapersonal (e.g., emotional intelligence) and demographic (e.g., living in a single parent home) variables to create latent profiles in a sample of kindergartners to identify risk profiles for externalizing behavior and academic functioning in fifth grade. Finally, Parra and colleagues (2006) identified risk profiles across interpersonal, intrapersonal, and demographic processes to identify risk for internalizing and externalizing symptoms 1 year later in a large, community sample of adolescents. Of note, Parra and colleagues (2006) identified similar profiles across 7 and 11th graders, and specific subgroups at risk for depressive symptomatology due to maladaptive familial and peer relationships. The present study sought to extend these collective findings by being the first study to a) utilize a multi-wave, prospective design to understand risk for depression, b) examine specificity to depression, and c) investigate how profiles, and their relationship to depression, may vary across developmental epochs (i.e., late childhood, early adolescence, and middle adolescence) within an empirically-based person-centered approach.

Examining potential interpersonal profiles of risk specifically for youth depression is important for several reasons. First, depression represents one of the most common disorders

in youth, with up to 24 % of youth experiencing clinical symptoms of depression before the age of 18 (Merikangas and Knight 2009). Adolescence represents a particularly important time for the emergence of depression (Hankin et al. 1998), partially due to the changing social demands both within the family and between peers that occurs during adolescence (Brown and Bakken 2011). In response, clinical interventions for depression have shown that targeted work on interpersonal relationships can lead to the successful alleviation of symptoms across youth populations (Young and Mufson 2008). In light of these findings, the present study specifically focused on malleable, interpersonal risk factors to make the findings more applicable to clinical interventions such as interpersonal psychotherapy (IPT; Young and Mufson 2008). Furthermore, given the high rates of comorbidity between depression and anxiety symptoms (Cummings et al. 2014), we examined whether profiles specifically corresponded to depressive symptoms or internalizing distress more broadly. Findings for depressogenic-specific interpersonal profile across age groups can lead to more targeted efforts in the prevention and treatment of youth depression.

The present study built on previous studies (Hubbard et al. 2013; Seidman et al. 1999) by examining profiles of perceived support and conflict in family and peer networks. Our sample included 3rd, 6th, and 9th graders to capture critical developmental periods in regard to depression (Abela and Hankin 2008) and changes in one's social ecology (Brown and Bakken 2011; Epkins and Heckler 2011). Our goal for the present study was three-fold. First, we examined what profiles existed between negative and positive relationships across peer and family contexts. Based on research that has described both convergence (e.g., youth with positive friend and family relationships) and non-convergence (e.g., youth with positive friend and negative family relationships) profiles (Brown & Bakken, 2011; Epkins and Heckler 2011) we hypothesized that both would be identified in our study.

Second, we tested which profiles uniquely relate to prospective depressive symptoms. Given that research which focused on overall relationship quality (i.e., as opposed to parenting styles) failed to find support for a buffering hypothesis with regard to emotional distress (Laursen and Mooney 2008) we predicted that both convergence and non-convergence profiles would relate to elevated depressive symptoms over time. Finally, we investigated the impact of sex and age on the formation of profiles, and potential moderating effects on the relation between profiles and emotional distress. Because of the emerging importance of peer relationships in adolescence (Brown and Bakken 2011), we hypothesized that a) non-convergence profiles may be more common in older youth compared to younger youth due to parental conflict around peer issues and b) that the relationship between interpersonal profiles and depression may strengthen as one becomes older. Furthermore, consistent with Cyranowski et al.'s (2000)

theoretical model and Hankin and Abramson's (2001) elaborated cognitive vulnerability-transactional stress theory, we hypothesized that girls in our sample would be more sensitive to the deleterious, depressogenic-impact of problematic interpersonal profiles.

## Methods

### Participants

Youth were recruited by brief information letters sent home directly to families with a child in 3rd, 6th, or 9th grade in participating school districts in New Jersey and Colorado. The letter stated that we were conducting a study on social and emotional development in youth and requested that interested participants call the laboratory to receive details about the study. In total, 1,108 parents responded to the letter and called the laboratory requesting more information. All parents who responded to the letters were screened and potential participants were excluded from the study if they did not speak English or were otherwise unable to complete an extensive laboratory protocol due to developmental, learning, or psychiatric disorder (e.g., schizophrenia). Of the families who initially contacted the laboratory, 678 (61 % participation rate) qualified as study participants, as they met the criteria and arrived at the laboratory for the assessment. Comparisons based on available screening variables between those who chose to participate and those who did not revealed no significant differences.

In sum, the 678 youth (CO,  $n=362$ ; NJ,  $n=316$ ) were fairly balanced with regard to sex (Male,  $n=298$ ; Female,  $n=380$ ) and grade (3rd=208, 6th=245, 9th=225). Families were generally upper-middle class (CO:  $Mdn=\$75,000$ ,  $SD=\$84,043$ ; NJ:  $Mdn=\$100,000$ ,  $SD=\$65,987$ ). Parental education was assessed on a 9-point scale. Parents in New Jersey had slightly higher levels of education, with 38 % of families having parents with college degrees (36 % in Colorado) and only 33 % of families in which neither parent had a college degree (42 % in Colorado). With regard to race our sample included White (62 %), Black (11 %), Latino (8 %), Asian/Pacific Islander (10 %) and other/multicultural (9 %). Finally, 77 % of caregivers reported they were married or otherwise living with a partner, and participants were typically living with three other people ( $Mdn=4$ ;  $SD=1.75$ ).

### Procedure

Phase 1 of the study involved a laboratory assessment. A research assistant (RA) met with the youth to complete all self-report measures. Meanwhile, Phase 2 of the study consisted of six telephone follow-up assessments. Assessments occurred every 3 months for 18 months

following the initial assessment. At each assessment, an RA administered a measure for depressive symptoms and anxiety symptoms. Participants were compensated \$60 at Phase 1, and \$15 per follow-up.

## Measures

**Network of Relationships Inventory (NRI**; Furman and Buhrmester 2009). The short-form of the NRI consists of 13 items that assess perceived quality of relationships, both positive and negative. An example item from the NRI is “How much do you and this person get upset or mad at each other?” Participants answer on a 5-point Likert scale from “Little or None” to “The Most” for the following relationships: mother, father, sibling, same-sex friend, and other-sex friend. In total, there were seven positive relationship questions and six negative relationship questions. Answers for each relationship were summed into two subscales (positive and negative). These subscales were averaged to create four total subscales: positive family (e.g., ratings for father, mother, and sibling on positive items), negative family, positive peer (e.g., ratings for same-sex and other-sex friend on positive items), and negative peer. In instances in which a participant was an only child, only one parent was evaluated, or other-sex friend was not evaluated, only the available scores were used to create the composite scores (e.g., in situations where a child had no siblings and only evaluated one parent, just the one evaluated parent’s scores were utilized as the composite score for family support and conflict). The NRI is a reliable and valid way to assess relationship perceptions in youth (Fuhrman & Burhmester, 2009; Hazel et al. 2014). For our study, coefficient alphas ranged between 0.89 and 0.92 indicating good reliability.

**Children’s Depressive Inventory (CDI; Kovacs 1992)** The CDI is a 27-item self-report questionnaire that measures the cognitive, affective, and behavioral symptoms of depression. Items are scored from 0 to 2, with higher scores indicating greater symptom severity. Youth are asked to circle a statement that describes him/her best. For instance one item is “I am sad once in a while (0), I am sad many times (1), I am sad all the time (2)”. The CDI is the most commonly used measure for assessing youth depression (Myers and Winters 2002). In the present study CDI scores ranged from 0 to 51 and the coefficient alphas were between 0.84 and 0.89 across administrations indicating strong internal consistency.

**Multidimensional Anxiety Scale for Children (MASC; March 1997)** The MASC is a 39-item measure that assesses the occurrence and intensity of anxiety symptoms. The measure was used in the present study to examine whether interpersonal profiles uniquely conferred risk for depressive symptoms. For this measure, the participant must determine the

degree to which each item is true of him or herself on a Likert scale from 0 (*never*) to 3 (*often*), with higher scores indicative of greater levels of anxiety symptoms. A sample item is “I worry about people laughing at me”. In the present study, only total scores on the MASC were utilized and scores ranged between 0 and 109. The MASC is a reliable and valid tool for assessing youth anxiety (Alloy et al. 2012; Brozina and Abela 2006). The MASC demonstrated good reliability across administrations in our study ( $\alpha=0.88$  and 0.90).

## Results

### Preliminary Analyses

Preliminary analyses suggested that depressive symptoms, negative family, and negative peer scales exhibited significant positive skew requiring a log transformation to satisfy assumptions of normality. Due to negative skew scores, the positive peer and positive family scales were squared and cubed respectively. Means and standard deviations for all measures, pre-transformations, are presented in Table 1. Table 2 contains the bivariate relations between all measured effects in our study.

Next, as missing data is common in multi-wave longitudinal data, we examined whether participants varied on the number of follow-ups completed. Overall, 63.8 % of participants completed all seven assessments, 19.4 % of participants missed one follow-up, 5.7 % missed two follow-ups, and 11 %

**Table 1** Means and Standard Deviations for Anxiety and Depressive Symptoms

Measures	Mean	SD	n
<i>CDI</i>			
Baseline	7.02	5.84	678
FU1	5.36	5.34	605
FU2	4.33	4.52	585
FU3	4.76	4.94	588
FU4	3.86	4.46	592
FU5	4.17	4.75	571
FU6	5.32	5.94	552
<i>MASC</i>			
Baseline	41.92	15.66	678
FU1	42.69	15.27	603
FU2	42.17	14.50	583
FU3	41.59	15.53	593
FU4	40.94	14.56	590
FU5	41.26	15.18	568
FU6	34.75	15.58	556

*CDI* Children’s Depressive Inventory (Kovacs 1992), *MASC* Multidimensional Anxiety Scale for Children (March 1997), *FU* Follow-Up



**Table 2** Correlation Table between Main Variables in Study

	1	2	3	4	5	6	7	8
1 Positive Family								
2 Negative Family	-0.20**							
3 Positive Peer	0.34**	0.04**						
4 Negative Peer	-0.00	0.44**	0.03*					
5 Anxiety	0.04**	0.07**	-0.01	0.07**				
6 Depression	-0.19**	0.32**	-0.02	0.21**	0.36**			
7 Sex	0.05**	0.10**	0.21**	0.02	0.13**	0.04**		
8 Grade	-0.19**	0.19**	0.12**	0.07**	-0.10**	0.17**	0.02	

*Positive Family* Network of Relationship Inventory (NRI; Furman and Buhrmester 2009), (perceived) Positive Family Subscale, *Negative Family* NRI, (perceived) Negative Family Subscale, *Positive Peer* NRI, (perceived) Positive Peer Subscale, *Negative Peer* NRI, (perceived) Negative Peer Subscale, *Anxiety* Multidimensional Anxiety Score for Children (MASC; March 1997) scores across all assessments, *Depression* Children's Depression Inventory (CDI; Kovacs 1992) scores across all assessments, *Grade* Participant's academic grade, *Sex* Participant's sex (Male=0, Female=1)

\*  $p < 0.05$

\*\*  $p < 0.001$

missed three or more follow-ups. The Hedeker and Gibbons (1997) approach was used to see if the number of follow-ups completed by participants influenced any of the hypothesized relations in our study. Overall, no significance was found for these tests ( $p > 0.05$ ), and it was concluded that data were missing at random. Expectation maximization (EM) was used to impute missing data. This approach yields more reliable parameter estimates than either pairwise or listwise deletion methods of dealing with missing data (Schafer and Graham 2002). A comparison of means between the original data set and imputed data revealed remarkably close statistics, supporting the use of imputed data (Shrive et al. 2006).

With regard to clinical significance, 4 % ( $n=33$ ) of our sample had a depression score on the CDI of 19 or higher, indicating clinical levels of depression (Kovacs 1981). Furthermore, 14 % of the sample qualified as having at least elevated depression (i.e., CDI score  $> 12$ ;  $n=94$ ) at our baseline assessment. As for anxiety, 10 % of the sample presented with clinical levels of anxiety symptoms ( $T$  score  $> 65$ ), and 24 % presented with elevated (i.e., slightly above average;  $T$  score  $> 55$ ) symptoms of anxiety. Clinical patterns on the CDI and MASC were similar to past community-based research with children and adolescents (see Wesselhoft, Sorensen, Heievang, & Bilenberg, 2013 for depression; see March 1997 for anxiety).

### What are the Youth Interpersonal Profiles?

We used the two-step cluster procedure with SPSS (22.0) to classify youths' interpersonal profiles. The two steps are: 1) pre-cluster the cases into many small sub-clusters; and 2) cluster the sub-clusters from step 1 into the desired number of clusters. The log-likelihood measure determined the distance between cases and sub-clusters. We utilized both the Bayesian Information Criterion (BIC) and Akaike's Information

Criterion (AIC) to determine cluster membership. Overall, both indices identified a three-cluster solution (BIC=2903.80; AIC=1418.24) as the best solution, as it provided a better fit for the data compared to a two-factor solution (BIC=-174.94; AIC=-216.12), and a similar fit for the data (BIC=+25.22; AIC=+92.37) when using a four-cluster solution. Due to providing a slightly better cluster-estimate (Zhang 2004), final cluster membership was determined using the BIC. Overall, the final three-cluster solution included 100 % of the sample, was appropriately balanced in size (Henry et al. 2005), and had a silhouette coefficient of  $S(i)=0.40$ , indicating an adequate amount of cohesion and separation between the data points based on these clusters (Kaufman and Rousseeuw 2009). Perceived positive (Predictor Importance;  $PI$ : 1.0) and negative ( $PI$ : 0.99) peer relationships were the most important predictors of cluster membership compared to perceived negative ( $PI$ : 0.67) and positive ( $PI$ : 0.47) family relationships.<sup>1</sup>

Once we identified clusters, we next conducted "ANOVAs" to examine differences between the clusters on specific scale information (e.g., how the clusters differ on positive/negative relationships). These are not true ANOVAs because part of the IVs (scale score) is contained in the DVs (the clusters); however, they are an efficient, and quasi-empirical way of understanding group differences (Henry et al. 2005). Results suggested that the three-cluster solution was significant for all four variables (i.e., clusters were

<sup>1</sup> Due to important developmental differences, we also tested cluster-solutions for third, sixth, and ninth grade separately. When tested independently a three cluster solution was also identified, and the silhouette measure of cohesion and separation for each sample was consistent with the statistic for the overall sample. Therefore, the three-cluster solution which was identified with the whole sample was used for all analyses.

significantly different with regard to each subscale on the NRI;  $p < 0.0001$ ). The mean levels for perceived negative and positive relationships for each cluster are presented in Table 3, along with results from Bonferonni post-hoc tests. Qualitative labels were assigned to each cluster group: *Supported* (elevated levels of positive family and peer relationships, and low negative peer and family relationships), *Neglected* (the lowest levels of peer and family positive relationships, and low peer and family negative relationships), and *Conflicted* (elevated peer and family negative relationships, and low-average peer and family positive relationships).

A chi-square analysis was conducted to examine any systematic differences with regard to sex and grade. Overall, significance was found for both sex,  $\chi(2)=9.17$ ,  $p=0.01$ , and grade,  $\chi(4)=12.68$ ,  $p=0.01$ . Males (40 % of all males) were significantly more likely than females (29 % of all females) to be categorized as *Neglected*; 9th graders (34 %) were significantly more likely than 3rd (20 %) and 6th (28 %) graders to be grouped into the *Conflicted* cluster; 3rd graders were most likely to be grouped into the *Neglected* cluster (43 %), and underrepresented in the *Conflicted* cluster (20 %). Finally, it was examined whether household demographics significantly related to distinct cluster membership. Findings suggested that neither marital status ( $p > 0.05$ ) nor household composition ( $p > 0.70$ ) related to specific interpersonal profiles.

### Do these Clusters Predict Depressive Symptoms Over Time?

Next, multilevel modeling (MLM) was used to test if our clusters predicted changes in prospective depressive symptoms. A random intercept ( $p < 0.0001$ ), random slope ( $p < 0.0001$ ), and autoregressive heterogeneous Level 1 covariance structure, ARH(1);  $p=0.001$ , were included in all analyses. The main predictor for our analyses was cluster membership (Level 2 variable). Given demographic imbalances, grade and sex were included as fixed effects (Level 2). To test whether the effects were specific to depressive symptoms, anxiety symptoms (Level 1) were included as a covariate. To control for suppressor effects, the relation between cluster membership and depressive symptoms were only considered significant when both including and excluding anxiety symptoms (Miller and Chapman 2001; Schwartz et al. 2006). However, as controlling for anxiety symptoms is believed to be the more rigorous test, statistics presented below reflect estimates including anxiety symptoms as a covariate. Finally, time was included as a fixed effect to see if the relation between cluster membership and depressive symptoms increased over time (i.e., a significant interaction between time and cluster membership) or if elevated symptoms at baseline maintained over time (i.e., significant main effect for cluster membership

with time as a covariate). The dependent variable was depressive symptoms throughout the study (Level 1).

Results suggested that neither sex ( $p > 0.25$ ) grade ( $p > 0.51$ ), nor grade and sex ( $p > 0.77$ ) moderated the relation between cluster membership and symptoms.<sup>2</sup> Thus, the interaction terms were eliminated from the remaining models. Results for our final model are presented in Table 4. The groups significantly differed in predicting depressive symptoms. Bonferonni post-hoc analyses were conducted to examine group differences. As illustrated in Fig. 1, the *Conflicted* group experienced elevated symptoms compared to the *Supported* and *Neglected* groups ( $p < 0.001$ ). Although scores in each cluster decreased over time, which is typical for multi-wave research (Twenge and Nolen-Hoeksema 2002), the significant cluster differences were maintained across the 18 months,  $t(1195)=4.64$ ,  $p < 0.001$ . However, no group differences were found between the *Supported* and *Neglected* groups ( $p > 0.20$ ). To ease interpretation, transformed predicted CDI values from our models have been “back-transformed” to reflect CDI scores within the range of the scale.

### Supplemental Analyses

As our main analyses indicated that cluster membership predicted depressive symptoms above and beyond anxiety symptoms, we tested if findings were unique to depressive symptoms. Identical multilevel models were built to test the relation between clusters and anxiety. In sum, both when controlling for concurrent depressive symptoms and when testing our hypotheses independent of depressive symptoms, interactions for grade/sex were insignificant ( $p > 0.20$ ), as were findings for a main effect between clusters and anxiety symptoms ( $p > 0.50$ ).

A final step was taken to test our hypotheses using latent profile analyses (LPA; Berlin et al. 2014). Similar to two-step cluster analyses, LPA represents a valid analytic approach to testing similarities and differences among a group of people instead of relations among variables (i.e., a person-centered approach; Muthén and Muthén 2010). Findings across both person-centered approaches can provide further support for our study’s findings. Utilizing MPlus (version 6), our four interpersonal variables (negative family, positive family, negative peer, and positive peer) were entered as indicators of a categorical latent construct representing different interpersonal profiles.

<sup>2</sup> Based on reviewer feedback, the authors also tested whether the relationship between household demographics influenced the relation between clusters and depressive symptoms. Multilevel analyses demonstrated that neither household composition ( $p > 0.50$ ) or marital status ( $p > 0.90$ ) moderated this relation.

**Table 3** Means (and Standard Deviations) for Group, and Means for Each Cluster

	Overall Group	Cluster 1	Cluster 2	Cluster 3
Negative Peer	10.45 (3.99)	8.83 (2.34) <sup>3</sup>	8.59 (2.18) <sup>3</sup>	14.89 (4.05) <sup>1,2</sup>
Positive Peer	23.30 (6.20)	28.02 (3.60) <sup>2,3</sup>	17.91 (4.49) <sup>1,3</sup>	23.45 (5.42) <sup>1,2</sup>
Negative Family	14.49 (4.78)	12.96 (3.79) <sup>2,3</sup>	12.47 (3.39) <sup>1,3</sup>	19.02 (4.33) <sup>1,2</sup>
Positive Family	25.25 (5.07)	28.53 (3.36) <sup>2,3</sup>	22.81 (4.58) <sup>1,3</sup>	23.65 (5.24) <sup>1,2</sup>
<i>N</i> (% of sample)	633 (100 %)	241 (38.1 %)	215 (34 %)	177 (28 %)
Qualitative Label	***	Supportive	Neglected	Conflicted

*Negative Peer* Network of Relationship Inventory (NRI; Furman and Buhrmester 2009), (perceived) Negative Peer Subscale, *Positive Peer* NRI, (perceived) Positive Peer Subscale, *Negative Family* NRI, (perceived) Negative Family Subscale, *Positive Family* NRI, (perceived) Positive Family Subscale, *Cluster* Two-Step cluster analysis profiles, *Superscript* Mean differences between indicated clusters (e.g., <sup>1,2</sup> above Cluster 3 for Negative Peer represents that mean for Negative Peer is significantly higher than the means for Clusters 1 and 2 on Negative Peer)

To determine the fewest number of profiles that best characterized mean-level patterns among the interpersonal variables, information criteria based indices (i.e., Akaike information criteria, Bayesian information criteria), the entropy criterion (Celeux and Soromenho 1996), as well as the Lo-Mendel-Rubin likelihood ratio test (LMR LRT; Lo et al. 2001) and Vuong-LMR LRT (Muthèn & Muthèn, 2010) were used. LPA identified that a 2-class solution (AIC=16332.253; BIC=16391.267; Entropy=0.877; LMR LRT=201.95,  $p < 0.001$ ) provided a significantly better fit of the data compared to a one-class solution ( $p < 0.001$ ) but not a three-class solution ( $p = 0.70$ ). Similar to our cluster analyses, LPA supported a convergence model, but suggested a “supported” and “conflicted” two-class solution best explained the data, as opposed to the cluster-analytic three-class solution. Interestingly, 100 % of youth in the LPA “conflicted” profile were also classified as “conflicted” within our cluster analyses. Furthermore, findings concerning depression and anxiety were consistent between the two profiles, as the LPA “conflicted” profile corresponded with elevated depressive symptoms over time,  $t(640) = 6.22$ ,  $p < 0.01$ , while controlling for anxiety symptoms, but did not predict anxiety symptoms ( $p > 0.50$ ).<sup>3</sup>

**Discussion**

The present study provides a thorough understanding of youth’s interpersonal risk for depressive symptoms. Overall, we found convergence between family and peer realms, and that perceived conflict uniquely forecasted depressive, but not anxiety, symptoms in youth. These findings, together with implications regarding interpersonal risk profiles, are discussed below.

<sup>3</sup> Complete details concerning LPA models can be obtained by contacting the corresponding author.

Perceived interpersonal conflict is a well-documented risk factor for depressive symptoms (Coyne 1976; Epkins and Heckler 2011; Rudolph 2008). Identifying the exact mechanism that leads from interpersonal stressors to depressive symptoms has become an important focus of research over the past 25 years (Rudolph 2008). One explanation, the stress generation model (Hammen 2006), postulates a vicious cycle in which chronic interpersonal stressors (i.e., peer and family conflict) predict depressive symptoms, which in turn, impact one’s daily functioning and lead to increased conflict. Youth in the conflicted profile may represent children and adolescents suffering through this stress generation model (Hammen 2006). Similarly, youth in this profile may be experiencing a myriad of past negative events or negative cognitive, interpersonal, or personality styles that contribute to interpersonal conflict and also directly predict depressive symptoms (Liu and Alloy 2010).

Although social support from friends and family is traditionally viewed as a protective factor for depressive symptoms (Coyne 1976; Epkins and Heckler 2011), our study is

**Table 4** Multilevel Model Outcomes for Depressive Symptoms

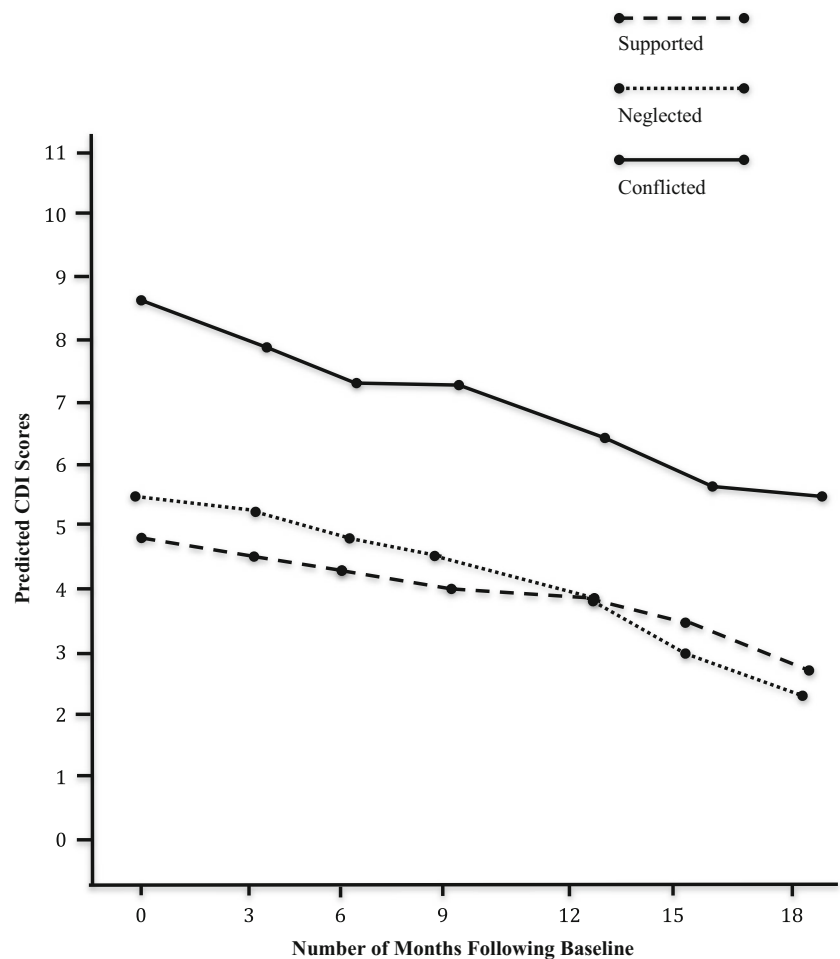
	<i>T</i>	<i>Df</i>	<i>R</i> <sub>effect size</sub>
Intercept	7.58**	795	0.26†
Grade	6.73**	602	0.26†
Sex	-0.12	601	0.00
Anxiety Symptoms	16.70**	3637	0.27†
Time	-5.44**	993	0.17†
Cluster	4.64**	1195	0.13†
Cluster x Time	-1.54	968	0.05

*Grade* Participant’s academic grade, *Sex* Participant’s sex (Male=0, Female=1), *Anxiety Symptoms* Multidimensional Anxiety Scores for Children (MASC) scores across all assessments, *Time* Baseline and Follow-up assessments (0–7), *Cluster* Two-Step cluster analysis profiles for perceived negative and positive relationships

\*\*  $p < 0.01$

† Small effect size

**Fig. 1** Expected depressive symptoms are plotted over time for interpersonal clusters



consistent with recent studies that question the exact role of self-perceived social support at a young age (Gifford-Smith and Brownell 2003; Lakey and Orehek 2011). While a “tipping point,” in which self-perceived social support becomes so low that it represents a unique risk factor probably exists, findings from the present study suggest that moderate or even low-moderate levels of self-perceived social support (i.e., 0.70–1.00 standard deviations below the group mean) may not predict depressive symptoms on its own. Other developmental literature suggests that additional contextual factors, such as social competence (Burton et al. 2004), may predict emotional well-being in youth even when perceived social support in certain domains is low. Our results show the importance of accounting for negative aspects of interpersonal relationships when assessing perceived social support as a risk/protective factor for depression.

It is noteworthy that findings were unique to prospective depressive symptoms. This is consistent with extensive literature that frames interpersonal vulnerabilities as unique to depressive disorders (Joiner and Metalsky 2001). Joiner et al. (2005) found that perceived interpersonal stressors specifically related to prospective depressive, but not anxiety

symptoms in a sample of young adults. The authors suggested that this may be due to depressive-specific cognitions (e.g., hopelessness) being activated during these elevated times of stressors. Reassurance seeking may also be a key factor that explains why conflicted youth may be at unique risk for prospective depressive symptoms. Youth feeling invalidated in one social setting (e.g., perceived conflict at home) may seek reassurance in another social domain (e.g., with friends) but display an interpersonal style that actually produces conflict within this domain as well. Past research suggests that this may begin a depression-specific vicious cycle in which the youth, now feeling depressed, continues to use reassurance-seeking strategies that create elevated conflict and exacerbate depressive symptoms (Joiner and Metalsky 2001). The inclusion of intrapersonal cognitive and coping mechanisms when examining these person-centered interpersonal profiles may lead to a better understanding of how these interpersonal profiles develop and the specific pathways that lead to depressive, but not anxiety, symptoms.

Although a person-centered approach provides a comprehensive understanding of interpersonal risk for emotional distress, it may miss important dyadic relationships. Null



findings in the present study concerning sex and age are inconsistent with literature that documents sensitivity to problematic interpersonal relationships among girls and adolescents (Furman and Buhrmester 1992; Hankin and Abramson 2001; Lewinsohn and Essau 2002). For instance, adolescents (as opposed to children) and girls (as opposed to boys) may be at greater risk for depression when experiencing elevated levels of peer conflict (Noakes and Rinaldi 2006; Rose and Rudolph 2006). These underlying patterns of risk may be difficult to detect within a person-centered approach. Therefore, person-centered approaches should be viewed as complementary analytic approaches to be synthesized with traditional variable-centered analyses.

Although age and gender did not moderate any depression outcomes, some important demographic differences emerged. Age differences, which showed increased representation in the *Conflict profile* for 9th graders and decreased membership for 3rd graders, are consistent with a developmental literature that shows dependent stressors with family (Collins and Laursen 2004; De Goede et al. 2009) and peers (Noakes and Rinaldi 2006; Rubin et al. 2005) increase with age. Meanwhile, 3rd graders' overrepresentation in the *Neglected profile* is also consistent with developmental literature. Dependency (i.e., physical proximity to caregivers) in addition to availability (i.e., access to caregivers during times of stress) are both critically important during late childhood; however, this pattern changes starting in early adolescence when the importance of dependency decreases (Lieberman et al. 1999). In the present study, only aspects of availability were directly assessed possibly underestimating perceptions of parental support within our third grade sample. In addition, third graders' elevated presence in the *Neglected profile* was also likely linked to the decreased levels of peer support at this young age (as demonstrated by the negative bivariate correlation between positive peer relationships and age). Past research showed that children (4th grade) consistently report lower levels of perceived peer support compared to early (7th grade) and middle adolescents (10th grade; Epkins and Heckler 2011; Rubin et al. 2005).

As for sex differences, our findings are similar to past research that shows boys report lower levels of peer support compared to girls (Furman and Buhrmester 1992; Galambos 2004). This may be due to the deeper, more interdependent friendships girls create, while boys tend to have friendships rooted in mutual interests (e.g., sports, hobbies; Bowlby 1969; Lieberman et al. 1999). Thus, overrepresentation of 3rd graders and boys in the *Neglected profile* may be normative as opposed to serving as a variable risk factor for these populations. This may explain why the *Neglected profile* was not predictive of depressive symptoms in the present study. Furthermore, null findings between the *Neglected profile* with regard to depressive symptoms, coupled with the supplementary latent profile analyses (LPA) combining the *Neglected*

and *Supportive profiles* into a single construct, suggests emotional neglect, as a construct, may not be detected through standard relationship quality measures. Given the important developmental impact of emotional neglect, developing appropriate procedures to assess neglect represents a critical public health goal (see Kantor et al. 2004). Findings from the present study suggest that screening for emotional neglect may have to be done in a more targeted way as opposed to using perceived relationship quality measures.

One final noteworthy finding regarding our profiles was the convergence in quality between peer and family relationships. Attachment theory offers a useful framework to contextualize these findings. According to attachment theory (Bowlby 1969; Cassidy and Shaver 1999), children exposed to supportive caregivers develop an expectation (i.e., working model; Fraley, Roisman, Haltigan, 2013) that others will be available and supportive in times of need. This bond leads the child to seek out supportive relationships outside of the family later in childhood and adolescence (Collins and Laursen 2004). Past research shows that early, supportive attachments with parents lead to positive relationships within interpersonal networks in childhood and adolescence (Fraley et al. 2013; Rubin et al. 2004), while more problematic family relationships early in life relate to deficits in social development (Fraley et al. 2013).

## Conclusion

Although the large sample size, multi-wave longitudinal design, and rigorous, multi-analytic approach are all strengths of our study, there are notable limitations. First, self-report measures were used in the present study. Integrating multi-method approaches such as interviews for clinical symptoms and sociometric (Prinstein 2007) or observational data (Hudson and Rapee 2001) for interpersonal functioning is important for future research. With specific regard to interpersonal functioning, utilizing self-reports only allowed for inferences concerning youth *perceptions* of positive and negative relationships, as opposed to the actual quality of the relationship. Although we utilized psychometrically sound measures, relying on self-report measures does not protect against possible depressive biases when reporting on peer and family relationships. Furthermore, our interpersonal assessment only occurred during baseline preventing us from assessing the transactional relationship between interpersonal relationships and emotional distress (Hammen 2006). It is important for future studies to assess both objective and subjective relationship appraisals over time to better understand the prospective stability and impact of belonging to a *Conflicted* risk profile early in life. With regard to our self-report clinical assessment, it should be noted that more updated versions of our anxiety

(MASC) and depression (CDI) measures exist and should be utilized in future, related research.

A second limitation in the present study is that consistent with other non-experimental research (McClelland and Judd 1993), our effect sizes were in the small range so cautious interpretations should be made until further replication. Testing our person-centered solution within a clinical sample may be a logical next step for these replications as it may provide a stronger clinical picture concerning the impact on depressive symptoms over time. Our inability to explore symptom growth over time may have been limited by lower levels of clinical symptoms and the pattern of decreasing depressive symptoms across assessment intervals, common issues when conducting community-based research with youth (Twenge and Nolen-Hoeksema 2002; Wesselhoft et al., 2013). Finally, anxiety hypotheses were only tested with a total anxiety score. As important differences exist between types of anxiety (e.g., social anxiety) and interpersonal relationships and depression (Epkins and Heckler 2011), future research should test whether these findings would differ when looking at different forms of anxiety.

Our findings have important implications for treating depression in youth. These findings support the continued use of empirically based treatments that focus on the interpersonal context of depression (e.g., IPT; Young and Mufson 2008), and suggest specifically highlighting negative relationships in treatment. Furthermore, convergence between family and peer relationships shows that similar themes in one context probably generalize to other interpersonal domains. As continued person-centered research develops, a more complete understanding of the development of depression can emerge, which will continue to inform interventions for vulnerable youth populations.

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