

Peer victimization linked to negative affect in children with and without ADHD



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ABSTRACT

Objective: Children with ADHD are more likely to experience peer victimization relative to unaffected peers. Affect appears to be an important factor in determining which children are likely to experience peer victimization, as peers typically prefer children who demonstrate less negative and more positive affect. In this study, we explored the association between child affect and peer victimization in children with and without ADHD.

Method: One hundred and four 8–12 year old children (59 ADHD, 45 non-ADHD) and their parents completed measures of peer victimization. Parents completed an Ecological Momentary Assessment protocol whereby they rated the child's affect three times daily for 28 days.

Results: Hierarchical linear regression analyses significantly supported the relation of negative affect to peer victimization in both child- and parent-report, with parent-report of peer victimization moderated by child ADHD diagnostic status.

Conclusion: Overall, this study suggested that negative affect plays an important role in peer victimization in children with and without ADHD.

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1. Introduction

1.1. Peer victimization

Peer victimization is the experience of being a target of aggressive behavior from one's peers (Hawker & Boulton, 2000). Although many children will experience peer victimization at times, for some children peer victimization is a chronic and stable phenomenon. Associated with detrimental outcomes in child development, chronic peer victimization affects 10–30% of children (Hunter, Boyle, & Warden, 2007; Nansel et al., 2001; Solberg & Olweus, 2003), becomes increasingly stable over time (Scholte, Engels, Overbeek, De Kemp, & Haselager, 2007), and negatively affects children's social and psychological well-being (Glew, Fan, Katon, Rivara, & Kernic, 2005; Hawker & Boulton, 2000; Reijntjes, Kamphuis, Prinzie, & Telch, 2010). Most literature suggests peer victimization includes overt (e.g., physical and verbal attacks) and relational (e.g., gossip and ostracism) forms of victimization (Crick & Grotpeter, 1995, 1996). If not addressed, overt and relational forms of victimization may result in psychosocial adjustment difficulties (Crick & Grotpeter, 1996; Prinstein, Boergers, & Vernberg, 2001) and

may contribute to long-term outcomes of psychopathology observed in children who experience chronic or severe peer victimization (Gladstone, Parker, & Malhi, 2006; Schreier et al., 2009).

There are numerous social and behavioral factors that increase the risk of children experiencing chronic peer victimization. Two well established factors are poor social skills and poor peer relations (Hawker & Boulton, 2000; Salmon & West, 2000). Boivin and Hymel (1997) suggest that children who are rejected by their peers and demonstrate deficits in social functioning are more likely to experience peer victimization. Similarly, studies suggest that chronically victimized children tend to have fewer friends (Perry, Hodges, & Egan, 2001), report poorer friendship quality than their peers (Bollmer, Milich, Harris, & Maras, 2005), and have more negative interactions with their peer group due to their social status (Coie, 1990). Given research indicating that high-quality friendships protect children from peer victimization experiences (Hodges, Boivin, Vitaro, & Bukowski, 1999), children who fail to demonstrate social competence may be at an increased risk for victimization.

Emotion regulation and coping strategies are important for social competence and social adjustment (Hubbard & Dearing, 2004; Rose-Krasnor, 1997). Rosen, Milich, and Harris (2012), have identified emotional reactivity and emotion regulation difficulties as potent risk factors for increased peer victimization in children. Coping with peer conflict requires that children regulate their negative emotional reactivity in order to minimize potentially rewarding expressions of emotional distress and effectively engage in prosocial and assertive conflict

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resolution behaviors, which have been shown to improve peer relations (Chung & Asher, 1996). Effective emotion regulation skills in the presence of peer threat thus requires that children monitor and control their own emotions and behavior, appraise peer signals, and execute an effective coping strategy (Mahady Wilton, Craig, & Pepler, 2000).

1.2. Peer victimization and emotion regulation

Emotion regulation is the fundamental process by which individuals control and modify the valence and intensity of their emotional states to adapt to internal and external demands (Cole, Martin, & Dennis, 2004). Emotion regulation is a multifaceted and multidimensional process (Rosen & Epstein, 2010) used to describe processes involved in coping with heightened levels of positive and negative emotions (Kopp, 1989), and has emerged as a risk factor in the development of chronic peer victimization in children (Hanish, Kochenderfer-Ladd, Fabes, Martin, & Denning, 2004; Rosen et al., 2012). Godleski, Kamper, Ostrov, Hart, and Blakely-McClure (2015) suggest that children who are victimized by their peers may have difficulty expressing developmentally appropriate emotions. This inability to effectively express developmentally appropriate emotions may provoke victimization from peers (Shields, Ryan, & Cicchetti, 2001) and interfere with use of learned prosocial conflict resolution skills, putting children at greater risk of experiencing victimization in peer conflict. Oftentimes, victims who are unable to control emotion arousal to allow for use of assertive and effective conflict management instead resort to fear or anger responses.

Victimization may also increase the likelihood that children approach social situations negatively in the future (Hanish et al., 2004). Specifically, children who have experienced victimization from peers are more likely to experience distress from perceived signs of threat. Potential threat is often unavoidable for children, and learning to modulate negative affect in the presence of threat is an important developmental milestone (Kopp, 1989). When children fail to modulate experiences of negative emotions, they demonstrate dysregulated reactivity that may lead them to experience numerous indicators of social dysfunction, including low social status (Maszk, Eisenberg, & Guthrie, 1999) and poor social skills (Eisenberg, Fabes, Guthrie, & Reiser, 2000). Given that children are seen as socially competent when they regulate their emotions (Hubbard & Coie, 1994), children who fail to effectively regulate their emotions (and specifically negative emotions) are often considered undesirable by their peers, as children tend to prefer peers who demonstrate fewer negative emotions (Hay, Payne, & Chadwick, 2004). When children fail to regulate negative emotions, they may be more likely to ineffectively respond to peer interactions. Thus, emotion regulation skills are necessary to prevent dysregulated reactivity, which may make it more difficult for children with strong negative emotions to positively interact with their peers.

Children who fail to effectively regulate strong negative emotions are often easily frustrated and more likely to demonstrate greater negative affect when distressed (Gross, 1998). This failure to respond appropriately may impair peer functioning and lead to a greater risk of being victimized. Research demonstrates that negative emotions exhibited in the context of peer interactions are positively correlated with victimization, whereas positive emotions were negatively correlated with victimization (Hanish et al., 2004). Furthermore, children unable to regulate negative emotions tend to experience social problems such as aggression, isolation and rejection (Eisenberg et al., 2001), which may negatively affect peer interactions. Certain disorders, such as Attention-Deficit/Hyperactivity Disorder (ADHD), have been known to co-occur with both emotion regulation difficulties (Shaw, Stringaris, Nigg, & Leibenluft, 2014) and peer difficulties (Hoza et al., 2005).

1.3. Peer victimization and ADHD

Numerous studies have indicated that children with ADHD experience considerable problems with social functioning (Biederman,

Faraone, & Chen, 1993; Cantwell, 1996), have poor peer relationships (Hoza et al., 2005), and are more likely to be victimized by their peers (Unnever & Cornell, 2003; Wiener & Mak, 2009). In a study investigating peer relations in children with ADHD from the Multimodal Treatment of ADHD Study (MTA Cooperative Group, 1999a, 1999b), Hoza and colleagues (2005) found that children with ADHD were less well-liked, had fewer reciprocated friendships, and were more likely to be rejected by their peers. Furthermore, Hoza et al. (2005) found that deficits in social functioning and impaired peer relations in children with ADHD were not solely explained by comorbid disorders such as oppositional defiant disorder, conduct disorder, or anxiety.

Emotional difficulties frequently co-occur with ADHD (Shaw et al., 2014; Rosen & Factor, 2015), and literature suggests emotion dysregulation be incorporated into conceptualizations of ADHD (Barkley, 2010; Martel, 2009; Rosen, Epstein, & Van Orden, 2013; Shaw et al., 2014). However, most discussions of the peer difficulties of children with ADHD focus on the excessive negative behavior and deficits in social skills (Wheeler & Carlson, 1994). Peers avoid children who demonstrate emotionally dysregulated behavior (Hubbard & Coie, 1994), and children with difficulty regulating emotion often suffer from high rates of peer impairment. Furthermore, research has consistently shown more problems with emotion dysregulation and emotional reactivity among children with ADHD than children without ADHD.

Negative affect in children with ADHD may be more dysregulated, unpredictable and less goal-oriented than negative affect in unaffected children. Children with ADHD demonstrate greater negative affective reactivity than children without ADHD (Shaw et al., 2014), and given that dysregulated negative affective reactivity is linked to greater peer victimization both concurrently (Hanish et al., 2004) and longitudinally (Rosen et al., 2012), this greater negative affective reactivity may put children with ADHD at risk for higher rates of peer victimization compared to their typically developing peers. Furthermore, negative affect may be particularly impairing among children with ADHD given the high levels of behavioral and attentional impulsivity inherent to the diagnosis of ADHD (American Psychiatric Association, 2013). Children with ADHD may be more prone to emotional and behavioral impulsivity than unaffected children which may make them more likely to demonstrate increased emotional reactivity with decreased ability to inhibit and modulate negative affect (Rosen, Waleries, Fogleman, & Factor, 2015). In instances of distress, negative affect may differentially impact children with and without ADHD in that children with ADHD may be less likely to inhibit and regulate negative emotions leading to emotionally driven negative affect expression that is aversive to peers. Given that negative affect may impact children with and without ADHD differentially, children with ADHD may report higher rates of victimization due to their inability to inhibit and modulate negative emotions. The current study examined the relation of negative and positive affect and peer victimization in children with and without ADHD.

1.4. Research questions

Given the evidence of the link between peer victimization and emotion dysregulation, and the link between emotion dysregulation and ADHD, we sought to examine the association between intensity of child positive and negative affect and peer victimization in children with and without ADHD. The following hypotheses were posited:

- 1a) There will be main effects of both negative affect and ADHD status on the estimation of parent- and child-report of peer victimization, such that ADHD and negative affect will each be uniquely associated with peer victimization.
- 1b) Although there is a paucity of literature examining how positive affect impacts peer victimization, it is possible that low levels of positive affect will also be associated with higher peer

victimization. Exploratory analyses will assess if a main effect exists of positive affect in the estimation of peer victimization.

- 2) Given differences in behavioral impulsivity and emotional expressiveness in children with and without ADHD, the relation of negative affect to peer victimization will be moderated by ADHD diagnostic status. Specifically, children with higher levels of negative affect will be at the greatest risk for peer victimization in the presence of ADHD.

2. Method

2.1. Participants

One-hundred and four children ages 8–12 and their families participated in the present study. Participants in the current study included fifty-nine children with ADHD (38 boys, 21 girls; M age = 9.61, SD age = 1.19) and forty-five children without ADHD (22 boys, 23 girls; M age = 9.93, SD age = 1.27) (See Table 1). Children were recruited through advertisements distributed through local schools in a mid-sized Midwestern metropolitan area. To ensure consistency across the Ecological Momentary Assessment (EMA) protocol, children were only eligible for participation if they were resident in a single home (i.e., two-parent or single-parent family) full-time over the course of the study. The Diagnostic Structured Interview for Children (DISC; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000) was used to assess ADHD status. All children in the ADHD group met full criteria for ADHD combined type. The ADHD module of the DISC-P contains a question related to current use of psychotropic medications to treat ADHD (stimulant and non-stimulant). This question was used to assess active ADHD medication usage. Thirty-two of 59 children who met full criteria for ADHD combined type, and 0 of the 45 children who did not meet full criteria for ADHD were receiving medication treatment at the time of study. Medication treatment was kept consistent throughout the EMA protocol.

Children without ADHD represented a community sample rather than a healthy control sample, thus children were not excluded from the study if they had symptoms of ADHD but did not meet criteria for diagnosis. Children in the non-ADHD group ranged from 0 to 5 total symptoms of inattention (M = 1.33, SD = 1.64) and hyperactivity/impulsivity (M = 0.65, SD = 1.25). To ensure that the non-ADHD sample represented a true community sample, children in the non-ADHD group were included in the study regardless of the presence of internalizing and externalizing disorders other than ADHD.

The ethnic composition of the sample was reflective of the area from which the population was collected (United States Census Bureau, 2010) with 63.5% of the children described as European-American, 26.9% of the children described as African-American, 3.8% of the sample described as Hispanic-American, 1.0% described as Asian-American, and 4.8% of the sample described as having more than one ethnic background.

Table 1
Demographic and racial/ethnic distribution for ADHD and non-ADHD diagnostic groups.

	ADHD	Non-ADHD
Mean age	9.61 ± 1.19	9.93 ± 1.27
Sex (M)	64.4%	48.9%
<i>Race/ethnicity</i>		
European-American	35	31
African-American	18	10
Hispanic-American	4	0
Asian-American	0	1
Multietnic-American	2	3

Note: ADHD N = 59; Non-ADHD N = 45.

3. Procedures

3.1. Baseline session

Parents of children provided informed consent and children provided assent prior to initiation of any study procedures. During a baseline session, parents completed a structured diagnostic interview to determine whether their child met criteria for ADHD (DISC-P; Shaffer et al., 2000). Parents and children completed the Perception of Peer Support Scale (PPSS; Ladd, Kochenderfer, & Coleman, 1996) at the time of baseline assessment to assess parent-perceived and child self-perceived frequency of peer victimization. Parents received training in completion of the EMA protocol. Parents and children each received compensation for completing the baseline session.

3.2. EMA protocol

EMA describes methodologies developed to collect real-time data from participants within the context of their typical daily lives (Stone & Shiffman, 1994). EMA provides substantially more accurate response data than retrospective or summary report, even when compared to end-of-day recall (Stone & Shiffman, 1994). Ebner-Priemer and Trull (2009) note that accurate assessment of patterns of emotional intensity and variability requires methodologies that account for amplitude, variability, and temporal dependency. By allowing for repeated assessment over time, EMA methodologies allow the researcher to better understand an individual's emotional state to account for both frequency and intensity of emotional arousal (Ebner-Priemer & Trull, 2009). EMA has been successfully used to assess affective intensity and variability in children with and without ADHD in previous studies (Rosen et al., 2012; Suveg, Payne, Thomassin, & Jacob, 2010; Whalen et al., 2009). EMA was thus selected to measure intensity of negative and positive affect in the current study.

Parents completed EMA-based ratings three times a day for a period of 28 days (84 total ratings). The 28-day assessment period was selected over the shorter (i.e., 1 week) periods utilized in previous studies (i.e. Suveg et al., 2010, Whalen et al., 2009) to ensure that assessments captured a full temporal range of positive and negative affective frequency and intensity. All ratings were completed using Palm® Tungsten E2 Personalized Data Assistants (PDA), that had been programmed using Purdue Momentary Assessment Tool software¹ (PMAT; Weiss, Beal, Lucy, & MacDermid, 2004). The PDA set off alerts at three specific predetermined intervals (i.e., before school, after school, and evening) requested by parents to be compatible with the family schedule within specific windows (between 7 and 10 AM, between 3 and 6 PM, and between 6 and 9 PM). Specific predetermined alert times were chosen over random alerts as it was determined that random alerts were not practical for a parent-report protocol. Specifically, the parent-report EMA protocol in the current study required parents to be in the presence of their child when completing ratings so as to allow for accurate 'spot-moment' ratings of their child's positive and negative affect. Accordingly, random assessment intervals were not practical given the typical variation in parent's and school-aged children's daily schedules. Parents were asked to complete ratings at all time points.

Parents were instructed that one parent was to be responsible for completing all EMA intervals to allow for assessment of within-informant variability, and that the parent EMA ratings were to be completed by the same individual as the baseline ratings. Parents indicated their identity (i.e., mother, father, guardian) prior to completing ratings at each time. At each time point, parents were asked to complete a 10-item version of the Positive and Negative Affect Scale (PANAS) – Parent Report (Phillips, Lonigan, Driscoll, & Hooe, 2002) regarding their

¹ Baseline sessions were conducted between 2011 and 2014. The use of Palm® Tungsten E2 Personalized Data Assistants was necessary given that at the time of study initiation, there had been limited software development for EMA on other approved devices.

perception of their child's positive and negative affect *at the specific time of the assessment*. The 10-item version of the PANAS was created using the items from Thompson's (2007) 10-item PANAS-short form. Child-report EMA was not used in the current study as two previous studies have indicated that children are less likely to complete ratings during intervals where they are reported as experiencing negative affect (Rosen et al., 2012, 2013), and thus are not appropriate for assessing negative and positive affectivity over time.

To enhance participant adherence to the EMA protocol, parents were provided with compensation that was commensurate with their completion of EMA ratings. Specifically, each week parents could receive up to \$10 (\$40 total over the 4 weeks) dependent on the percentage of completed rating intervals. Parents were asked to attend weekly follow-up visits to have data uploaded from the PDA, and were allowed to request weekly changes to the schedule of alerts at these visits to enhance adherence and prevent disruption to the family's daily life. All procedures within the present studies were approved by the local Institutional Review Board.

4. Measures

4.1. Measures of overall emotional and behavioral difficulties

The *Diagnostic Structured Interview for Children- Version IV, Parent Report (DISC-P; Shaffer et al., 2000)* was used to provide diagnostic assessment of children in the study. The DISC-P is a diagnostic structured interview that provides a reliable means of assessing for the presence of psychological disorders in children. The DISC-P has demonstrated reliability and validity in a broad array of settings (Shaffer et al., 2000).

4.2. Measures of peer victimization

The *Perception of Peer Support Scale (PPSS; Kochenderfer & Ladd, 1997; Ladd & Kochenderfer-Ladd, 2002)* was used to assess parent and child perceptions of peer victimization. The PPSS is a 12-item child- and parent-report measure of the child's peer victimization experiences. Parent-report and child-report measures of victimization were selected for the current study so as to allow for the comparison of parent-observed affect to parent perceptions and child self-perceptions of the frequency of children's peer victimization experiences. Given research indicating that parent- and child self-report each contribute unique variance to the estimation of peer victimization (Ladd & Kochenderfer-Ladd, 2002) and evidence suggesting that the children with ADHD may overestimate their social competence relative to other-report (Hoza et al., 2004), use of a multi-informant composite of peer victimization was inappropriate given both the sample and the study aims. Accordingly, parent-reported and child self-perceived victimization were examined separately in the present study. The PPSS parent- and child-report scales demonstrated excellent internal consistency in this study (α s = 0.95, 0.92).

4.3. EMA measures of affect

The *Positive and Negative Affect Scale (PANAS, Watson, Clark, & Tellegen, 1988)* was used in the EMA assessments to assess total positive and negative affect. The PANAS was administered to parents three times daily for twenty-eight days as part of the EMA protocol. At each time point, parents filled out a 10-item PANAS (Phillips et al., 2002) to assess their perceptions of their children's positive and negative affect. The 10-item PANAS was created for this study by adapting the items from the adult self-report 10-item PANAS-Short form using the analog items from the 20-item parent-report PANAS. Studies have indicated that the 10-item PANAS is psychometrically analogous with the full version (Thompson, 2007). The 10-item PANAS parent-report was used for the EMA assessment intervals in this study to reduce the time demands of the EMA assessment protocol and minimize the interference of the

study procedures on the participants' daily lives. The PANAS has previously demonstrated utility in studies utilizing an EMA methodology (Shrier, Shih, & Beardslee, 2005), and the 10-item PANAS parent-report demonstrated feasibility and validity as a means of assessing affective intensity and variability in previous studies (Rosen et al., 2012, 2015). Prior to creating EMA variables, each EMA assessment time-point was examined to ensure that it had been completed by the primary rater in the presence of the child. Parent-report time points were removed from the dataset if a) they were not completed by the primary rater, or b) the parent indicated that the child was asleep or not physically present.

Negative affect and positive affect scores were created for the PANAS parent-report at each EMA interval by summing all responses from that particular EMA time-point to the PANAS parent-report, respectively. Mean scores were then created from the PANAS parent-report to represent the mean affect across all intervals. Mean scores were created by 1) summing each within-day rating (i.e., morning + afternoon + evening) for 28 days of the study to generate a total score 2) averaging the total score by the number of parent responses. Mean scores were created from the PANAS to assess parent-report of children's positive affect and negative affect. All data was analyzed using SPSS® 22 software.

4.4. Power analysis

Power analyses were conducted using G*Power to determine the strength of the analyses to detect a medium effect size when all six predictors, including an interaction term, were entered in the model ($f^2 = .15$, $\alpha = .05$, $n = 104$). Power analyses supported the study as adequately powered to detect R^2 deviations from zero when all predictors were entered (Power = .83). Power analyses also supported the study as adequately powered at each step of the model as evidenced by R^2 increase for the first step (Power = .91), second step (Power = .97), third step (Power = .97), and fourth step, which included an interaction term (Power = .97).

5. Results

Before EMA variables were created based on the PANAS ratings, every rating time point was inspected to ensure it was completed by the designated rater in the presence of the child. If either of these conditions were violated the time point was removed. Adherence data was analyzed after inappropriate time points were removed. Parents completed an average of approximately 83.06% of the 84 possible assessment intervals (SD = 14.62%; min = 25%, max = 100%), with 95% of parents completing at least 50% of all possible intervals. Overall, parents demonstrated necessary adherence to the EMA protocol.

5.1. Bivariate analyses

Initial bivariate analyses (See Table 2) were conducted to assess the relation of ADHD and the EMA-derived measures of negative affect (i.e., parent-reported PANAS negative affect mean) and positive affect (i.e., parent-reported PANAS positive affect mean) to parent- and child-report of PPSS. A significant point-biserial correlation was observed between ADHD diagnostic status and the parent-report PPSS ($r[104] = .24$, $p = .02$), indicating that ADHD was associated with significantly greater parent-report of peer victimization. However, ADHD was not significantly associated with the child-report PPSS ($r[103] = .17$, $p = .09$). Significant positive Pearson correlations were also observed between parent-reported EMA-derived negative affect and both parent-report PPSS ($r[104] = .28$, $p = .004$) and child-report PPSS ($r[103] = .31$, $p = .002$), indicating that greater parent-reported negative affect was significantly associated with greater parent- and child-report of peer victimization. Parent-reported EMA-derived positive affect was not significantly associated with parent-report ($r[104] = .13$, $p = .21$) or child-report ($r[103] = -.12$, $p = .23$) of

Table 2

Summary of bivariate correlations for ADHD diagnostic status, parent-report of PPSS, child-report of PPSS, and parent-report of PANAS positive affect and PANAS negative affect.

Measure	ADHD	PPSS-PR	PPSS-CR	PANAS-PA	PANAS-NA
ADHD					
PPSS Parent-Report (PPSS-PR)	.24*				
PPSS Child-Report (PPSS-CR)	.17	.53***			
PANAS Positive Affect (PANAS-PA)	-.05	.13	-.12		
PANAS Negative Affect (PANAS-NA)	.22*	.28**	.31**	-.04	

Note: N = 104, * $p < .05$, ** $p < .01$, *** $p < .001$.

peer victimization. Accordingly, parent-reported positive affect was not included in multivariate analyses.

5.2. Multivariate analyses

Two multivariate hierarchical linear regression analyses were conducted to examine the effect of parent-reported EMA-derived negative affect and ADHD on parent- and child-report of PPSS. Both parent-report PPSS and child-report PPSS were regressed on the EMA-derived indicator of negative affect (parent-reported PANAS negative affect mean) and ADHD. Age, sex, and active ADHD medication use were entered into the first step to control for factors that are known to be associated with differing rates of peer victimization in children with ADHD. Given that previous studies have indicated a strong relationship between ADHD and peer victimization, ADHD diagnostic status was entered into the second step to assess the main effects of ADHD diagnostic status in the estimation of parent- and child-report of PPSS when controlling for age, sex, and active ADHD medication use. In the third step, parent-reported PANAS negative affect mean scores were entered to assess the main effect of negative affect in the estimation of parent- and child-report of PPSS when controlling for age, sex, active medication use, and ADHD status. An ADHD by parent-reported PANAS negative affect mean interaction was entered in the fourth step to assess whether or not ADHD moderated the effect of negative affect in the estimation of peer victimization. Akaike Information Criteria (AIC) was used to assess model fit, with ΔAIC signifying the difference between the AIC with the inclusion of ADHD and negative affect and the next best fitting model. Negative ΔAIC scores indicated lower AIC and thus improved fit for the inclusion of the main effects and/or the interaction term in the overall model.

5.3. Relation of parent-reported negative affect and ADHD diagnostic status to parent-report of peer victimization

Results supported the hypothesis that more frequent and intense negative affect is positively associated with parent-report of peer victimization (see Table 3). Examination of the covariates entered into the first step suggested that they did not contribute significantly to model fit for parent-report, $\Delta R^2 = .03$, $p = .42$, $AIC = -15.46$, of peer victimization. Step two of the model indicated that the step containing the main effects of ADHD contributed moderate variance to the estimation of parent-report of peer victimization,² $\Delta R^2 = .03$, $p = .06$, $AIC = -17.09$, $\Delta AIC = -1.63$. Step three of the model suggested that parent-reported negative affect contributed significant variance to the estimation of parent-report of peer victimization, $\Delta R^2 = .06$, $p = .02$, $AIC = -21.36$, $\Delta AIC = -4.27$. Specifically, children who had higher parent-reported PANAS negative affect mean scores had higher parent-report ($\beta = .25$,

² When ADHD medications were removed from the parent-report model, the step containing ADHD status contributed significantly to the estimation of peer victimization, $\Delta R^2 = .06$, $p = .02$, $AIC = -19.07$, $\Delta AIC = -3.92$.

Table 3

Summary of hierarchical regression: Relation of parent-reported negative affect to the estimation of parent-report of peer victimization is best modeled as a moderation effect with ADHD.

Step/variable	R ²	ΔR^2	AIC	B	SE	t	β
Step 1	.03	.03	-15.46				
Sex (Male = 0, Female = 1)				.10	.19	.56	.06
Age				-.06	.07	-.80	-.08
Stimulant medication use (no = 0, yes = 1)				.30	.20	1.50	.15
Step 2	.06	.03	-17.09				
ADHD (non-ADHD = 0, ADHD = 1)				.42	.22	1.88	.23
Step 3	.12	.06	-21.36				
PANAS Negative Affect				.22	.09	2.47*	.25
Step 4	.18	.06	-26.79				
PANAS Negative Affect \times ADHD				.51	.19	2.68**	.29

Note: N = 104, * $p < .05$, ** $p < .01$.

$t = 2.47$, $p = .015$) ratings of peer victimization. Results suggested that greater parent-reported negative affect, but not ADHD status, was associated with greater parent-report of peer victimization, as ADHD was not uniquely associated with parent-report of peer victimization above and beyond the impact of NA ($\beta = .18$, $t = 1.50$, $p = .14$). Step four of the model suggested that the effect of parent-reported negative affect on the estimation of parent-report of peer victimization was moderated by ADHD diagnostic status, $\Delta R^2 = .06$, $p = .009$, $AIC = -26.79$, $\Delta AIC = -5.43$, such that negative affect was more strongly related to peer victimization in children with ADHD rather than children without ADHD ($\beta = .29$, $t = 2.68$, $p = .009$; see Fig. 1). Results supported the overall model with interaction included, $R^2 = .18$, $F(6, 102) = 3.48$, $p = .004$. Overall, with all predictors included, results suggested that greater parent-reported negative affect was related to greater parent-report ratings of peer victimization in children, but indicated that this relation was moderated by ADHD diagnostic status.

5.4. Relation of parent-reported negative affect and ADHD diagnostic status to child-report of peer victimization

Results supported the hypothesis that negative affect is positively associated with child-report of peer victimization (See Table 4). Examination of the covariates entered into the first step suggested that they did not contribute significantly to model fit for child-report of peer victimization, $\Delta R^2 = .02$, $p = .55$, $AIC = -114.77$. Results did not indicate a significant contribution of the step containing the main effects of ADHD diagnostic status to the estimation of child-report of peer victimization,³ $\Delta R^2 = .01$, $p = .26$, $AIC = -114.10$, $\Delta AIC = .67$. Step three containing parent-reported negative affect contributed significantly to the model fit for child-report of peer victimization, $\Delta R^2 = .07$, $p = .01$, $AIC = -119.97$, $\Delta AIC = -5.87$. Specifically, children who had higher parent-reported PANAS negative affect mean scores had higher self-report ($\beta = .30$, $t = 2.78$, $p = .007$) ratings of peer victimization. However, ADHD status was not significantly associated with child-report ($\beta = .14$, $t = 1.13$, $p = .26$) of peer victimization. Furthermore, results did not support an interaction of parent-reported negative affect and ADHD diagnostic status in the estimation of child-report of peer victimization, $\Delta R^2 = .00$, $p = .91$, $AIC = -117.99$, $\Delta AIC = .02$, ($\beta = -.02$, $t = -.11$, $p = .91$), suggesting that the model was best fit by a main effect of parent-reported negative affect, $R^2 = 0.11$, $F(5, 101) = 2.27$, $p = .05$, of peer victimization. Overall, with all predictors included, results suggested

³ When ADHD medications were removed from the child-report model, the step containing ADHD status did not contribute significantly to the estimation of peer victimization, $\Delta R^2 = .03$, $p = .10$, $AIC = -115.94$, $\Delta AIC = -.87$.

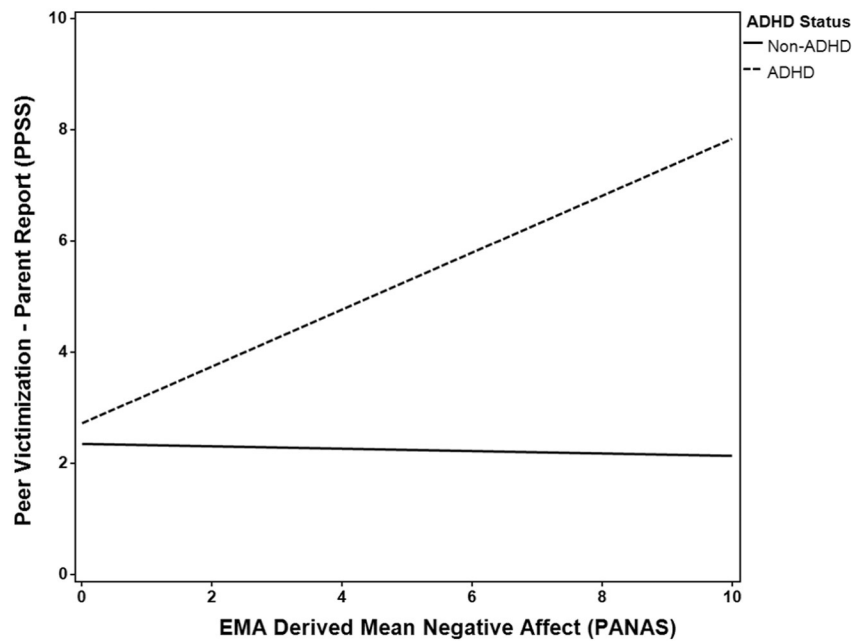


Fig. 1. Relation of Parent-report Negative Affect and Peer Victimization Moderated by ADHD Diagnostic Status. Parent-report negative affect on the estimation of parent-report of peer victimization was moderated by ADHD diagnostic status ($\beta = .29$, $t = 2.68$, $p = .009$), such that parent-reported negative affect was more strongly related to peer victimization in children with ADHD rather than children without ADHD.

that greater parent-reported negative affect, but not ADHD status, was associated with greater child-report of peer victimization.

6. Discussion

The current findings present a step towards examination of the relation of positive and negative affect and peer victimization in children with and without ADHD. Consistent with our hypothesis, results supported the relation of frequency and intensity of negative affect to both parent-reported and child self-perceived peer victimization. Results suggest that ADHD moderated the impact of parent-reported negative affect on parent-reported peer victimization, but that ADHD was not related to child self-perceived peer victimization. Furthermore, results did not support the hypothesis that low levels of positive affect would be linked to peer victimization. Overall, the current findings support the assertion that negative affect is an important factor in the estimation of concurrent peer victimization.

7. Implications

7.1. Theoretical implications

The results of the current study suggest that negative affect is significantly linked to concurrent peer victimization. Negative affect

describes a specific pattern of child affect characterized by feelings of negative emotions, and these findings are consistent with previous research indicating that negative emotionality is associated with more frequent peer victimization experiences (Hanish et al., 2004). Several studies have indicated that children with ADHD experience more frequent peer victimization than typically developing children, (Unnever & Cornell, 2003; Wiener & Mak, 2009), and the current cross-sectional study suggests that one contributing factor may be their difficulty regulating and coping with frequent and intense negative affect.

Shaw et al. (2014), noted that emotional difficulties account for much of the impairment experienced by children with ADHD. More specifically, the poor impulse control that is central to ADHD (Barkley, 1997) may make children with ADHD more susceptible to act on negative affective reactivity, amplifying the impact of negative affect and emotional difficulties. When children with ADHD experience negative emotions, they may fail to cope with these emotions appropriately and demonstrate greater negative affectively reactive behavior. This is particularly harmful in social settings because children who demonstrate more frequent and intense negative affective behavior may be more likely to upset members of their peer group, initiate greater amounts of peer conflict, and form and maintain quality friendships with their peers. Given that children prefer friends who express fewer negative emotions (Hay et al., 2004), and poor peer relations increase children's risk for victimization (Hawker & Boulton, 2000), the inability

Table 4

Summary of hierarchical regression: Relation of parent-reported negative affect to child-report peer victimization is best modeled as a main effects.

Step/variable	R ²	ΔR^2	AIC	B	SE B	t	β
Step 1	.02	.02	-114.77				
Sex (Male = 0, Female = 1)				.06	.11	.49	.05
Age				-.03	.05	-.71	-.07
Stimulant medication use (no = 0, yes = 1)				.16	.12	1.28	.13
Step 2	.03	.01	-114.10				
ADHD (Non-ADHD = 0, ADHD = 1)				.16	.14	1.13	.14
Step 3	.11	.07	-119.97				
PANAS Negative Affect				.22	.08	2.78*	.30
Step 4	.11	.00	-117.99				
PANAS Negative Affect \times ADHD				-.02	.15	-.11	-.02

Note: N = 104, * $p < .01$.

to regulate negative emotions appropriately may increase the risk of victimization (Pope & Bierman, 1999; Rosen et al., 2012). Furthermore, the frequency and intensity of their negative affect may make it more difficult for children to inhibit emotionally reactive behavior, and assertively cope with peer conflict and use prosocial behavior.

When children fail to monitor and control their own feelings and behavior, they have more difficulty initiating the coping strategies necessary for the emotion regulation process. The ability to cope with strong negative affect and inhibit negative emotional behavior may be more difficult for children with ADHD, and when children demonstrate negative emotions, they may become less desirable as a friend and may provoke victimization or rejection from peers (Shields et al., 2001). Given that children with ADHD are more likely to engage in emotional responses to threat, reward potential victimizers with a reaction, perceive ambiguous provocation as threatening, and be of lower social status than their peer counterparts, they may more frequently encounter experiences that elicit negative emotions. The current study suggests that children who fail to regulate and control their negative emotions may thus be at a greater risk to experience victimization due to the link observed between negative affect and peer victimization.

The relation of frequency and intensity of parent-reported negative affectivity to parent-report of victimization was moderated by ADHD diagnostic status, such that children with frequent and intense parent-reported negative affect were more likely to be experiencing concurrent parent-reported peer victimization if they had also been diagnosed with ADHD. The relation between parent-reported negative affect and parent-reported peer victimization may be partly due to shared rater variance. Parents in the current study provided information for ADHD diagnostic status, negative affect and peer victimization which may have contributed to the relation observed between parent-reported negative affect and parent-reported peer victimization in the presence of ADHD status. Given that children with ADHD have been shown to display deficits in social functioning and emotion regulation, parents of children with ADHD may regularly observe their children struggling across domains, leading to the finding that negative affect was more strongly related to peer victimization in children with ADHD.

Surprisingly, the results of the present study indicated that ADHD was unrelated to children's self-perceptions of the frequency of their experiences of peer victimization, even after stimulant medications were removed from the model. Results suggest that parent-reported negative affect was directly linked to child self-perceptions peer victimization, suggesting that children, with and without ADHD, who demonstrate higher parent-reported negative affect were more likely to self-perceive higher rates of victimization. The finding that ADHD was unrelated to child self-perceived peer victimization, and that parents and children had differing perceptions of peer victimization in the presence of ADHD, may be explained in part by the positive illusory bias, a well-known and robust finding regarding the social self-perceptions of children with ADHD. (Hoza et al., 2004). Positive illusory bias is the disparity between the self-perceptions of competence and actual competence (Hoza, Pelham, Milich, Pillow, & McBride, 1993). Children with ADHD are poor monitors of their social functioning, and Hoza et al. (2004) demonstrated that children with ADHD often overestimate their social competence relative to the reports of others. The positive illusory bias may prevent accurate self-evaluation, self-monitoring, and response social cues, and it may be the case that children with ADHD exhibit patterns of social information processing that are different from their unaffected peers (Hoza et al., 2004). Children who believe they have strong peer relations regardless of their actual social experiences may also be less likely to interpret peer threat and conflict as victimizing, and may be less likely to internalize peer victimization experiences. Given the well-established findings of significant social positive illusory bias in children with ADHD the lack of relation of ADHD to child self-perceptions of peer victimization may have been due to inflated self-perceptions (and/or self-reporting tendencies) of children with ADHD

rather than an actual lack of discrepancy in the peer experiences of children with and without ADHD.

The current study suggests that parent- and child-reports of peer victimization are not related to low levels of positive affect. Peer victimization is a negative construct and positive affect may be better correlated with a positive construct of peer interaction such as high friendship quality, closeness and warmth. Research indicates that high-quality friendships can protect children from peer victimization (Hodges et al., 1999), and it is possible that children with high-quality friendships demonstrate higher levels of positive affect. Additionally, Greene and Noice (1988) found that positive affect promoted creativity and problem solving which may assist children in regulating and coping with strong negative emotions. Although positive affect was unrelated to the frequency peer victimization in children with and without ADHD, it may be an important aspect of peer interaction and friendship quality.

Overall, while research suggests children with ADHD are more likely to be victimized relative to their unaffected peers, (Unnever & Cornell, 2003; Wiener & Mak, 2009), the current study demonstrates that children with ADHD may be at an increased risk for victimization given the link between ADHD and negative affective reactivity. Due to the emotional and behavioral impulsivity observed in children with ADHD, the inability of children with ADHD to inhibit their emotional reactivity and emotionally-driven behavior in the presence of negative affect, and the detrimental impact of negative emotional behavior and reactivity on peer relations (Rosen et al., 2012), the elevated rates of peer victimization observed in children with ADHD may be due in part to co-occurring frequent and intense negative affectivity. Furthermore, the link between negative affect and peer victimization in both parent- and child-report, suggests that children, with and without ADHD, who fail to manage, control, and regulate strong negative emotions are at a greater risk for peer victimization. These findings may help to explain why some children are more likely to experience peer victimization than others.

7.2. Clinical implications

The findings of the current study suggest the importance of considering emotional functioning in the assessment and treatment of peer difficulties in children with and without ADHD. For a child who is prone to strong negative emotional reactivity, potential threats of peer conflict are likely to provoke extreme distress. This level of extreme distress will often override learned prosocial behavior and lead the child to engage in ineffective responding through displays of extreme emotion distress (i.e., fear, anger, etc.). This is particularly problematic for children with ADHD, given that children with ADHD are already predisposed towards more intense emotional reactivity and emotional and behavioral impulsivity. When children with and without ADHD fail to control and cope with strong negative emotions, they may become more susceptible to victimization experiences.

The findings of the current study suggest that intervention among children who experience frequent peer victimization should focus on addressing emotional difficulties, and more specifically, negative emotional reactivity. Interventions focusing on assisting children with responding to emotionally-driven stimuli, managing feelings of negative emotions, and coping with negative emotions may reduce the frequency and intensity of impairing negative emotional reactivity, and may thus positively impact how effectively children regulate their negative affectivity in future peer interactions. Based on the observation that ADHD status moderated the relation between negative affect and peer victimization according to parents and research suggesting considerable difficulties regulating negative affect among children with ADHD (Shaw et al., 2014), particular attention may need to be given to helping children with ADHD manage their emotional reactivity and inhibit negative emotionally-driven behavior in the presence of peer conflict.

Studies have shown that dysregulation in emotional functioning is a key factor in emotional and behavioral difficulties, functional impairment (Anastopoulos et al., 2011), and parental stress experienced by children with ADHD (Graziano, McNamara, Geffken, & Reid, 2011). Research has supported the efficacy of stimulant medications and behavioral parent training for the treatment of the core symptoms of ADHD (Pelham & Fabiano, 2008). While these approaches have been successful for inattention, hyperactivity, impulsivity, and related functional difficulties of children with ADHD, little research exists regarding interventions for specific emotionally-driven internalizing and externalizing difficulties in children with ADHD (Shaw et al., 2014). To date, there have been no research treatments that have effectively addressed the emotional difficulties of children with ADHD (Shaw et al., 2014; Waxmonsky et al., 2012); however, future interventions which focus on addressing negative emotional reactivity may substantially improve the social behavior of children with ADHD, and thus reduce their frequency of experiencing victimization at the hands of their peers.

7.3. Limitations

This study provided encouraging support for the association of EMA-derived negative affect and peer victimization among children with and without ADHD. However, several limitations must be acknowledged. This study represented an initial examination of the relation of child affect and peer victimization in children with and without ADHD. Although this study demonstrated robust main effects of parent-report of negative affect in the estimation of both child- and parent-report of peer victimization, all data in this study were obtained concurrently. Thus, it is not possible to deconstruct the direction of the effects demonstrated in this study. Further studies are needed to demonstrate the longitudinal direction of this relation to determine if the negative affect assessed in this study is a cause or result of peer victimization in children with and without ADHD. Indeed, it is possible that a dynamic and bidirectional effect exists between affect and peer victimization.

EMA presents limitations as well. EMA-based ratings allow for multiple assessments of affect but do not provide information about context of the ratings. It was thus not possible to draw conclusions regarding why the ratings of a child's affect were elevated or decreased at any time point. Similarly, the parents' emotional state while completing ratings was not assessed. This is particularly relevant given both the substantial body of research suggesting that parents of children with ADHD experience significantly greater stress and the impact of parenting stress on parent ratings of children's affect. Additionally, the study did not have the capacity to collect EMA data during the school day. As school is often an area of significant difficulty for children who experience peer victimization, the procedures may have underestimated the effects of child affect among children with and without ADHD in the current study. However, given that the statistic used in this study to determine mean negative and positive affect can be artificially inflated when there is environmental or reporter variance between consecutive intervals, the present results may best be interpreted as an accurate representation of the child's emotional affect within the home setting. Similarly, this study relied on a single (parent) rater for the EMA-derived measure of affect. While previous research has suggested that child EMA ratings are unreliable given that children are more likely to refuse to complete ratings when distressed (Rosen et al., 2012, 2013), it is possible that the ratings of emotional affect were skewed according to parent characteristics. Additionally, parents in the current study provided information for ADHD diagnostic status, negative affect and peer victimization which may have contributed to shared rater variance. However, given the multimethod research design of the study, it is notable that the parent-reported EMA measure of negative affect was related to both parent- and child-reported measures of overall peer victimization in children with and without ADHD. Finally, this study relied on a predictable rather than a random schedule of assessment intervals. While it was necessary to allow parents to dictate the schedule of alerts to ensure that parents would be able to actively observe

their children while completing ratings, it is possible that this predictable schedule influenced the results by attenuating parent or child behavior in anticipation of the assessment intervals.

Our measures of peer victimization have limitations as well. The PPSS measures used in this study assesses parent-perceived and child self-perceptions of peer victimization. These methods measure important facets of peer victimization that are uniquely disparate from other measurements. Peer sociometrics, are often considered to be the "gold standard" in assessing peer victimization; however, studies indicate that child and parent reports of peer victimization each contribute valid and unique variance towards the assessment of peer victimization (Ladd & Kochenderfer-Ladd, 2002). Although limitations exist for understanding child- and parent perceptions of peer victimization experiences, the differences observed are consistent with previous literature showing that children and parents each have differing but valid perceptions of children's social functioning (Weissman, Orvaschel, & Padian, 1980). Children with ADHD often overestimate their social competence and parents of children with ADHD often underestimate their children's social competence. Although these are possible explanations for the results of the study, it is important to replicate the results of these studies using other forms of assessment (i.e., peer sociometric, teacher report) in future research to determine how these results generalize across differing reporters of peer victimization.

Due to practical limitations, a multi-informant approach could not be used to diagnose ADHD in the current study. Accordingly, the DISC-P was used to provide diagnostic assessment of children in the study (Shaffer et al., 2000). Although the DISC-P has demonstrated reliability and validity in the assessment of psychological disorders in children (Shaffer et al., 2000), use of a reliable and valid teacher instrument would have assisted in confirming ADHD combined type diagnosis. Furthermore, Wheeler Maedgen and Carlson (2000a, 2000b) have found emotion regulation deficits to be present in children with combined type of ADHD, but not in children with inattentive type of ADHD, which may help to explain the current findings. Given that the demonstration of negative affect may be linked to emotion regulation deficits, the current findings may only be applicable to children with combined type ADHD.

Although children with ADHD tend to provide more optimistic reports of their social functioning than their parents (Diener & Milich, 1997), the finding that parents of children with ADHD are more likely to link negative affect to peer victimization may also demonstrate the halo effect. The term "halo effect" refers to the impact of one class of behavior on another (Jackson & King, 2004). In regards to children with ADHD, parents who believe their child struggles in emotional and behavioral domains may be more likely to rate their child as someone who struggles in social domains. However, peer victimization and negative affect were assessed through different modalities, as negative affect was assessed by averaging the month-long repeated assessment of affective state (measured through EMA) and peer victimization was assessed using a retrospective report questionnaire. Therefore, this finding is more likely to indicate that it is the interaction of ADHD and negative affect that leads children to engage in the emotionally reactive behavior that may increase the risk for peer victimization.

8. Conclusions

The current study represents a critical step towards understanding the relation between child affect and peer victimization in children with and without ADHD. Negative affect appears to uniquely impact children who experience peer victimization, as the inability to regulate and control intense and variable negative emotions inhibits children's ability to cope with distress, control their negative emotions, and engage in prosocial behaviors. Furthermore, children who display greater negative affect may be more likely to experience peer victimization because they are emotionally impulsive and respond to stimuli with excessively intense emotional reactions, leading to a pattern of

emotionally-driven processing and behavior (Rosen et al., 2012). This pattern of impairment is differentially related to peer victimization by ADHD diagnostic status, and also uniquely associated with children who exhibit greater levels of negative affect. These children are more likely to be victimized by their peers according to both child- and parent-report measures of peer victimization. Our hope is that by improving our understanding of how child affect is related to peer victimization, we can improve our ability to assess and treat the emotional and behavioral functioning of all children.

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