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Polyvictimization and externalizing symptoms in foster care children: The moderating role of executive function

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Abstract

Prior research has identified the role of childhood maltreatment in externalizing problems and executive function (EF) deficits, but minimal work has been done to characterize the effects of co-occurring maltreatment types, defined as polyvictimization. Here, we sought to characterize the association between polyvictimization and externalizing problems in a sample of foster care children aged 3–4 years ($N = 84$) and examine how EF may mediate or moderate that relationship. A moderation model was supported in that only polyvictimized children with EF scores 1.62 or more standard deviations below the mean were at heightened risk for clinically severe externalizing problems, while no association between polyvictimization and externalizing problems were observed for children who scored at the mean or above on the EF measure. Findings highlight that EF may serve as a resilience factor indicating that individual differences in polyvictimized children's EF skills help to predict variability in externalizing problems. Future research on designing and optimizing intervention programs that target EF skills may mitigate the development of maladaptive outcomes for polyvictimized children.

Keywords

Polyvictimization; childhood maltreatment; externalizing problems; attention; executive functioning

Young children in foster care are disproportionately more likely to experience polyvictimization (i.e., multiple types of maltreatment; Pears, Kim, & Fisher, 2008) and, in turn, are at elevated risk for negative outcomes (Leeb, Lewis, & Zolotor, 2011). In a cross-sectional survey of children's exposure to violence, 49% of the children surveyed suffered two or more types of polyvictimization (Finkelhor et al., 2011); for children in foster care, rates of polyvictimization may be as high as 95% (Lau et al., 2005; Manly, Kim, Rogosch, & Cicchetti, 2001). Prior maltreatment research has largely focused on specific forms of abuse or neglect. In contrast, children's actual experiences often involve more than one type of maltreatment (Greeson et al., 2011; Turner, Finkelhor, & Ormrod, 2010). It is important to note that a wide range of variability exists not only in children's experiences of victimization types but *also* in the risk for associated negative outcomes.

A related issue among foster children is the documented presence of externalizing problems (e.g., defiance, aggression, impulsivity) commonly observed above and beyond other mental health issues (Stein, Mazumdar, & Rae-Grant, 1996). Of concern, externalizing symptoms are often precursors to negative outcomes, such as risk-taking, antisocial behavior, and suicidality (Campbell, Shaw, & Gilliom, 2000). Despite numerous studies documenting the high *prevalence* of externalizing problems in young children in foster care, ranging from 20% to 78% (Keil & Price, 2006), there is relatively little research investigating how variation in children's maltreatment experiences is associated with externalizing risk within foster care samples. Heterogeneity in individuals' responses to maltreatment is an important challenge for both researchers and practitioners (Afifi & MacMillan, 2011). Polyvictimization quantifies variability in maltreatment experiences to disentangle individual differences in externalizing problem risk. Focusing on the number of maltreatment types experienced is a promising approach to operationalizing polyvictimization (Cecil, Viding, Fearon, Glaser, & McCrory, 2017).

Polyvictimization and externalizing behavior

Externalizing problems are often observed in samples of polyvictimized children in foster care and community populations (Cyr et al., 2012; Turner et al., 2010). Theoretical perspectives lend insight into this association. From a social learning perspective, externalizing behavior can be conceptualized as modeling of observed parental behavior (Patterson & Yoerger, 2002). Per social learning theory, a child both witnessing domestic violence and experiencing physical abuse may have observed aggression and frequently engaged in coercive parenting interactions that urge the child to imitate the modeled behavior (Moylan et al., 2010). Experiences of multiple maltreatment types increase the repertoire of modeled behaviors from which children learn, thereby increasing the likelihood of similar violence perpetration. Attachment theory suggests that the lack of a responsive attachment figure within contexts of polyvictimization contributes to risk for externalizing behavior via the child's failure to develop effective self-regulatory emotional and behavioral strategies for dealing with distress, which is likely to be more pervasive across contexts in situations of polyvictimization (Stovall-McClough & Dozier, 2004). While supportive caregiving and authoritative discipline are associated with regulatory capacities (Kochanska, Murray, & Harlan, 2000; Spinrad et al., 2007), harsh discipline is linked to impaired self-regulatory capacities in children, including deficits in inhibitory control and behavioral regulation (Olson et al., 2011). In turn, diminished self-regulatory capacities may increase the risk for externalizing behavior (Fay-Stammbach, Hawes, & Meredith, 2014).

Numerous studies have demonstrated a robust link between early adversity and a range of externalizing behavior problems (e.g., aggression, delinquency). Several mediators and moderators underlying this relationship have been identified, such as emotion regulation (Kim & Cicchetti, 2010), parenting styles (Lansford et al., 2006), and compromised attention (Roman, Ensor, & Hughes, 2016). A study of community children aged 4–15 years found that externalizing problems significantly increased for each additional adverse event exposure (Fleckman, Drury, Taylor, & Theall, 2016). Few studies have investigated the risk of externalizing behavior in the context of polyvictimization; it is essential to further

delineate the complex relationship between co-occurring victimizations and externalizing symptomatology.

Executive function as a mediator or moderator in the path from polyvictimization to externalizing problems

Executive functions (EF), or the higher-order cognitive processes supporting goal-directed behavior, are considered a core capacity predictive of adaptive functioning (Garon, Bryson, & Smith, 2008). EF is considered to comprise at least three key subdomains—inhibitory control, working memory, and mental flexibility (Garon, Bryson, & Smith, 2008). Germane to the present investigation, deficits in EF appear to be strongly related to externalizing behavior in young maltreated children; a recent meta-analysis of primarily community-based studies reported a medium effect size for the association between EF and externalizing behavior (Schoemaker, Mulder, Deković, & Matthys, 2013). Attention is fundamentally involved in several EF component operations (Barkley, 1996) and the development of EF skills in pre-school-aged children may be in large part due to the role of attention (Garon et al., 2008). Further, performance on EF tasks is highly correlated with attention processes (Kane & Engle, 2003; Miller & Marcovitch, 2015).

The extent to which EF may be a mediator or a moderator in the association between polyvictimization and externalizing problems is a critical open question. Most extant work on this topic has focused on EF's role in the association between parental risk and externalizing behavior, which may inform the development of conceptual models to describe how a range of early experiences impact EF and, in turn, externalizing behavior. Child EF at age 3 has been shown to mediate the relationship between maternal depressive symptoms and externalizing problems at age 6 years (Roman et al., 2016). In a sample of families living in rural poverty, EF mediated the association between sensitive parenting and lower externalizing behavior longitudinally across early childhood (Sulik, Blair, Mills-Koonce, Berry, & Greenberg, 2015). These data suggest that EF skills may explain the link between maltreatment and externalizing behavior.

Evidence also exists for EF as a moderator, such that children with high EF demonstrate resilience following maltreatment, including lower risk for externalizing behavior, compared to children with low EF (Obradović, 2010). Attention skills have also been shown to moderate the link between maltreatment intensity and academic performance (Slade & Wissow, 2007). Such findings provide support for a resilience factor model, in which certain factors can either buffer children or heighten the risks of the negative impacts of early life adversity (Masten, 2001). EF skills are hypothesized to serve as a protective *or* risk factor underlying the link between polyvictimization and externalizing behaviors, in that deficits in EF place young children at particularly high risk for maladaptive outcomes while above average EF skills may buffer against the negative impacts of early life adversity.

Current study

Given the limited previous research examining links between polyvictimization and externalizing symptoms within maltreated samples, we first sought to examine the extent to

which polyvictimization increased risk for externalizing problems (defined as those in the borderline, or clinical range) in a secondary data analysis from a sample of foster care children. Polyvictimization was operationalized as the number of different maltreatment types experienced. We hypothesized that children with higher polyvictimization would be at elevated risk for externalizing problems. Next, we tested the relationship between polyvictimization and externalizing behaviors and investigated the role of EF in mediation and moderation models. Given support for both models in the literature, and a dearth of studies in polyvictimized samples, we did not have a specific hypothesis regarding whether EF would mediate or moderate the association between polyvictimization and externalizing problems. A mediation model would suggest that EF accounts for the link between polyvictimization and externalizing behaviors while a moderation model would indicate individual differences in children's EF skills place them at variable risk for externalizing problems, given a history of polyvictimization (see Figure 1).

Method

Participants

The sample comprised a subgroup of participants from a randomized controlled trial (RCT) of Multidimensional Foster Care for Preschoolers (MTFC-P; Fisher, Gunnar, Chamberlain, & Reid, 2000), which included children aged 3–6 years who were entering a new foster care placement between 2000 and 2003. The original sample included 117 maltreated foster care children (63 males) recruited from a mid-sized urban area in the Pacific Northwest participating in the RCT. For this study, we combined foster treatment and foster comparison arms into a single group for analysis. An additional 60 children were recruited from the community as a comparison sample. The community sample was recruited from the same geographic area and from low income households. The “community controls” had no history of child welfare involvement. While community controls are not the focus of the present study as they had no polyvictimization data, they are briefly included throughout the methods and measures to demonstrate the extent to which children in foster care exhibited functional impairment compared to community controls.

The present study analyzed foster care and community children aged 3–4 years due to an age restriction on the EF measure. Therefore, the sample was reduced to $N = 88$ foster care children and $N = 47$ community controls. For analyses comparing foster care children to the community controls on externalizing problems and EF scores, the full subsample was utilized. However, for analyses examining polyvictimization, EF, and externalizing problems, we only used the foster care sample.

Sociodemographic variables

The ethnicity of the sample reflects the local community: In the foster care sample, the ethnicity breakdown was: 88.9% Caucasian, 4.3% Native American, 5.1% mixed race/other, .9% Latino, and .9% African-American. In the community sample, 76.7% of the children were Caucasian, 6.7% Native-American, 6.7% mixed race/other, 1.7% Latino, and 6.7% African-American. In the foster care sample, 53.8% ($n = 63$) of the children were male

and the average age was 4.04 years ($SD = .85$). In the community sample, the average age was 4.33 ($SD = 0.79$) and 53.5% of the sample was male ($n = 32$).

Measures

Study measures were collected from children and foster parents in laboratory and home-based assessments after obtaining informed consent to participate in the research study. All procedures were developed in partnership with the local and state child welfare agencies and were approved by the Institutional Review Board.

Maltreatment profiles

The Maltreatment Classification System (MCS; Barnett, Manly, & Cicchetti, 1993) was utilized to code child welfare system (CWS) case records for lifetime maltreatment histories. The MCS codes for several types of maltreatment, including: physical abuse, sexual abuse, failure to provide (e.g., parental failure to provide adequate food, clothing, or a safe living environment), supervisory neglect (e.g., parental failure to provide age-appropriate supervision), emotional maltreatment (e.g., parental rejection, allowing the child to witness traumatic events), educational maltreatment (i.e., parental failure to send the child to school), and moral/legal maltreatment (i.e., parents using the child for illegal purposes). The rates for the latter two categories were extremely low: educational maltreatment ($n = 9$) and moral/legal maltreatment ($n = 1$). Because of the low base rates and the distinct nature of these categories, these two maltreatment types were dropped from further score calculation and analyses. The most common types of maltreatment experienced for the children aged 3–4 years were emotional neglect (90.9%), supervisory neglect (88.6%), and physical neglect (79.5%). Roughly one quarter of the foster care sample experienced physical or sexual abuse (Table 1).

Coding process

Caseworkers and the local child welfare agency consented to the review of case records. A child welfare representative excluded identifiable information. Coders completed extensive training on confidentiality agreements. Narratives of CWS referrals contained material about the specific types of maltreatment reported and investigated; however, narratives did not necessarily contain information on each type of maltreatment coded per MCS. Coders identified distinct maltreatment incidents from the narratives. To qualify as an incident, the event had to fit the MCS definitions of maltreatment and had to be reported by a mandatory reporter or caseworker. Maltreatment incidents were coded per type using the MCS.

Case records were coded by two coders who had been trained by an MCS author (Manley). To compute interrater agreement, 20% of the case records were double-coded. Overall, agreement on identification of incidents was high (80%). The average kappa was .72 across all the categories (physical abuse $\kappa = .82$, sexual abuse $\kappa = .67$, failure to provide $\kappa = .65$, supervisory neglect $\kappa = .65$, emotional maltreatment $\kappa = .79$).

Polyvictimization

Polyvictimization was conceptualized as a continuous measure of number of types of maltreatment experienced. Subject maltreatment types were coded from 0 to 5, with 0

indicating no maltreatment up to the maximum of 5 discrete maltreatment types. Overall, polyvictimization was frequent, with children experiencing an average of three different types of maltreatment. To note, 95.5% of this sample experienced polyvictimization, which is comparable to other maltreated samples (Lau et al., 2005; Manly et al., 2001).

Executive functioning

NEPSY: a developmental neuropsychological assessment—Children completed the NEPSY (Korkman, Kemp, & Kirk, 1998), which includes a series of 36 subtests assessing neuropsychological development across five domains, from which we specifically examined the Attention/Executive Functioning domain (other domains: Language, Sensorimotor, Visuospatial, and Memory and Learning). The EF domain assesses children's inhibition, self-regulation, and selective and sustained attention through two subtests.

Visual attention subtest—This subtest assesses children's speed and accuracy by instructing children to maintain attention and focus selectively on a visual target within a display. The first task is a simple selective attention task. The child is instructed to quickly locate and mark a picture of a bunny from various pictures in a linear array. Additionally, the child must search for pictures of a cat embedded within a random array of varying pictures.

Statue subtest—The statue subtest is designed to assess motor persistence and inhibition. Children are instructed to maintain a body position with their eyes closed for a 75 second period and to restrain any impulse to respond to sound distracters. Sound distracters include a pencil dropping, coughing, knocking on the table twice, saying "ho hum" and "time's up." A low score is indicative of poor inhibitory control and motor persistence.

Children in the foster care sample had a significantly lower average EF NEPSY scores of 93.11 ($SD = 15.02$) compared to the community sample average score of 99.24 ($SD = 12.75$) ($t(128) = -2.34, p = 0.021$).

Externalizing problems

Child behavior checklist—The CBCL (Achenbach, 1991) is a 112-item caregiver report for identifying problem behaviors in children. Caregivers rated children's behavior over the preceding 2 months on a 3-point scale (not true, somewhat/sometimes true, and very true/often true). The items yield a total score and two composite scores – Internalizing and Externalizing. The Externalizing subscale includes symptoms related to hyperactivity, defiance, aggression, and noncompliance. The CBCL externalizing subscale was dichotomized using a cut-off of T-scores ≥ 60 , following the recommended guidelines for referral to clinical services.

In the foster sample, 54.5% ($N = 48$) of the children met the cut-off indicating clinical levels of externalizing behavior symptomatology compared to 12.8% of the community sample ($N = 6$; $t(133) = 5.13, p < 0.001$).

Data analysis plan—We first assessed bivariate correlations between the variables of interest in the foster care children. This step included bivariate correlations with sociodemographic and CWS-related covariates to assess which covariates were related to EF

and/or externalizing behaviors. All covariates significantly associated with either variable were included in subsequent moderation and mediation analyses. Next, we tested the relationship between polyvictimization and externalizing behaviors, investigating the role of EF in mediation and moderation models. Specifically, we investigated the extent to which EF served as a mediator of the hypothesized association between polyvictimization and externalizing problems. We further investigated EF as a moderator of the hypothesized association between polyvictimization and externalizing problems, testing if high EF would be a protective factor from the presence of externalizing behaviors given a polyvictimization history.

Results

Preliminary covariate analyses

Zero-order correlations between all variables of interest and potential confounders, including age, number of out-of-home placements, maternal education, and gross annual household income were conducted (Table 2). Gender differences were examined with an independent t -test. Lower gross annual household income was positively correlated with externalizing problems ($r = 0.31, p < .001$). Age, number of transitions, and maternal education were not significantly correlated with any variables of interest (p -values $> .083$). There was a significant effect of gender on EF performance with boys performing worse than girls ($t(128) = -3.78, p < .001$). Accordingly, gender and annual household income were considered as covariates in subsequent multivariate analyses.

Multivariate analyses

To test baseline EF as a potential mediator or moderator linking polyvictimization to elevated externalizing problems, the PROCESS add-on module of SPSS v.22 was utilized (Hayes, 2013).

Missing data

Four children did not have complete data on the EF domain and were dropped from multivariate analyses due to listwise deletion procedures. Children who were missing data on the NEPSY test were more likely to have primary caregivers with lower education ($t(134) = 59.03, p < 0.001$). For all multivariate analyses, a sample size of $N = 84$ was included.

Mediation analysis

Polyvictimization was not associated with externalizing problems in initial bivariate correlations ($R^2 = .16, p = .15$; Figure 1, Path-C). Further, there was no association between polyvictimization and EF ($R^2 = .09, p = .43$; Figure 1, Path-A) or EF and externalizing ($R^2 = .13, p = .14$; Figure 1, Path-B). The model predicting EF from polyvictimization, gender, and household income was significant ($F(3, 76) = 5.07, R^2 = .18, p = .003$). Male gender predicted externalizing ($\beta = 11.54, SE = 3.09, p < .001$); no other predictors were significant. The overall model predicting externalizing from polyvictimization, gender, income, and EF was not significant (Cox & Snell's $R^2 = .05, p = .35$). No relation was observed between externalizing problems and any other variables, although there was a trend level direct effect for polyvictimization on externalizing in the full model ($\beta = .43, SE = .26$,

$p = .09$). No evidence was observed for an indirect effect of polyvictimization on externalizing problems through EF ($\beta = -.03$, bootstrap SE = .07, bootstrap CI = $[-0.25$ to $-0.04]$, indicating no support for a mediation model).

Moderation analysis

A moderation analysis was conducted predicting externalizing problems from polyvictimization, EF, an interaction of polyvictimization $\times$ EF, considering gender and household income covariates. In this model, polyvictimization was a trend level predictor of externalizing problems ($\beta = .49$, SE = .28, $p = .08$). The polyvictimization $\times$ EF interaction was a significant predictor of externalizing problems ($\beta = -.05$, SE = .02, $p = .026$). Neither EF nor the covariates were significant predictors of externalizing problems. Although the full logistic model, with covariates, was close to significant (Cox & Snell's $R^2 = 0.12$, $p = .07$), results indicated that this overall model did not explain significant variance in externalizing problems. To improve data fit, we removed non-significant covariates (gender and income; $p > .38$), resulting in a significant model fit (Cox & Snell's $R^2 = .11$, $p = .02$) with a similar pattern observed across predictors. In this final model, there was a trend level effect of polyvictimization on externalizing problems ($\beta = .47$, SE = .26, $p = .08$) and the interaction of polyvictimization $\times$ EF remained significant ($\beta = -.04$, SE = .02, $p = .04$). There was no significant direct effect of EF on externalizing problems ($\beta = -.028$, SE = .17, $p = .10$).

Conditional effects probing the polyvictimization $\times$ EF interaction from the final model are shown in Figure 2. The interaction was probed by testing the conditional effects of externalizing behavior at three levels of EF: one standard deviation (SD) below the mean (score = 78.09), at the mean ($M = 93.11$), and one SD above the mean (score = 108.13). As demonstrated in Table 3, externalizing problems were significantly related to polyvictimization only when EF was below the mean ($\beta = 1.06$, SE = 0.42, $p = .01$), but not when EF was at or above the mean. The Johnson–Neyman technique demonstrated that the relationship between externalizing problems and polyvictimization was significant when EF scores fell 1.62 SD below the mean score of 93.11 (e.g., an EF score = 91.49), but insignificant with EF scores higher than 91.49.

Discussion

Polyvictimization was highly prevalent in the present sample, as most of the children experienced three or more discrete types of maltreatment exposure, consistent with other high-risk samples (Lau et al., 2005; Manly et al., 2001). Externalizing problems were of clinical concern for the majority of this sample (57.3%), in line with prior research that maltreated children often exhibit elevated externalizing problems (Fleckman et al., 2016). Contrary to our first hypothesis, the final model indicated that polyvictimization and externalizing problems were marginally, but not significantly, related. This finding was unexpected, given the rich literature supporting a link between polyvictimization and externalizing behaviors (e.g., Keil & Price, 2006). Yet, the interaction of polyvictimization $\times$ EF was significant. This suggests that polyvictimization, as quantified from CWS records, may be a useful way of parameterizing individual differences in

maltreatment experiences. Findings indicate that the relationship between polyvictimization and externalizing problems may be contingent on underlying moderators. It is possible, given the high prevalence of externalizing behaviors in this high-risk sample, that there was insufficient variability to detect a direct link between polyvictimization and externalizing behaviors, lending support to the notion that underlying moderators are particularly valuable to delineating the association between early adverse experiences and externalizing symptomatology.

Results extend prior work which has linked maltreatment experiences with risk for the development of externalizing behavior following single victimization exposure, such as physical abuse (Lansford et al., 2002) or childhood sexual abuse (Jones et al., 2013). While informative, given the high rates of polyvictimization within maltreated populations, it is difficult and potentially of limited clinical utility to characterize the impact of a specific maltreatment type in isolation. The current study sought to address this gap by examining the role of polyvictimization in predicting externalizing symptomatology. We endeavored to build upon the knowledge base in this area by considering the role of EF skills – deficits documented in children with externalizing behaviors (Schoemaker et al., 2013).

EF is a key mechanism of interest in maltreated youth populations as prior research has demonstrated that children in high-risk samples often exhibit lower levels of EF (Roos, Kim, Schnabler, & Fisher, 2016). Consistently, foster children in this sample had significantly lower EF skills compared to the community controls. As noted, the literature has provided support for both mediation and moderation models of EF in the context of adversity in a variety of developmental stages (Obradovi, 2010; Sulik et al., 2015).

The present study did not support a mediation model, suggesting that EF does not fully account for the link between polyvictimization and externalizing symptomatology in our sample. Rather, our results supported a moderation model, indicating that individual differences in polyvictimized children's EF skills serve as a factor in predicting externalizing problems and that only children with low EF scores were at high risk for externalizing problems following polyvictimization. Polyvictimized children with average, or above average, EF scores were buffered against externalizing problems. Findings are in line with previous research demonstrating that higher EF aptitude predicts resilient functioning following adversity; in a study of homeless youth, children's EF emerged as the strongest predictor of adaptive functioning, including lower levels of externalizing behaviors (Obradovi, 2010). One possibility is that children with higher EF had more supportive parenting, even within the context of polyvictimization, contributing to enhanced EF and better behavior regulation (i.e., lower externalizing problems). Positive parenting practices are associated with both greater EF and regulatory capacities (Bernier, Carlson, & Whipple, 2010).

Inconsistent findings in the literature in characterizing EF as a mediator or moderator between maltreatment profiles and externalizing symptoms may be due in part to several factors, such as the limited number of studies, measures of EF utilized, the operationalization of maltreatment/polyvictimization, and the developmental age group investigated. Indubitably, EF plays a significant underlying role between maltreatment,

polyvictimization, and externalizing symptoms and should continue to be explored in a myriad of samples.

Implications

Externalizing problems observed at young ages place children at higher risk for future maladaptive outcomes and trajectories, including risk-taking, substance abuse, and incarceration (Campbell et al., 2000), and polyvictimization is a key risk factor. Externalizing problems are among the most reported behavioral issues in early childhood (Keenan & Wakschlag, 2004), comprising up to one half of mental health service referrals (Belsky, Melhuish, Barnes, Leyland, & Romaniuk, 2006). Without intervention, externalizing problems often remain stable and may increase from preschool across the lifespan (Stormont, 2002). Therefore, identifying young children at the highest risk of developing externalizing problems may ameliorate the likelihood of maladaptive trajectories. Our study suggests that EF skills may be useful in identifying maltreated children at the highest risk for externalizing problems.

EF may help identify children at highest risk and inform intervention design and optimization, potentially decreasing the development or exacerbation of early externalizing problems. While the research on this topic is limited, preliminary studies are promising. One intervention designed to enhance school readiness in foster care children, Kids in Transition to School (KITS), demonstrated significant positive impacts on children's self-regulatory skills, key components related to EF (Pears et al., 2013). A separate program for socioeconomically disadvantaged children found that baseline EF skills in 4-year-old children moderated the impact of the intervention on several positive outcomes (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008). EF is also a malleable skill, potentially responsive to therapeutic techniques and interventions (Diamond & Lee, 2011).

Results support that EF can serve both as buffering *and* a risk factor following adversity. For example, children with low EF could be more likely than those with higher EF skills to model negative behaviors (e.g., social learning theory) or be more affected by the lack of sensitive and responsive caregiving (e.g., attachment theory), placing them at elevated risk for developing externalizing problems following polyvictimization.

Limitations

Given the nature of secondary data analysis, our study was limited to one measure of EF from a subdomain of an overall neuropsychological test and the subtests (e.g., Visual Attention) could not be computed. Future research would benefit from replicating findings using more standardized EF tasks, such as the Flanker task and dimensional change card sort (Gershon et al., 2013). However, the NEPSY and its subtests have been used as a measure of EF for preschool-aged children in other studies (e.g., Klenberg, Korkman, & Lahti-Nuuttila, 2001; Thorell & Wåhlin, 2006). In the MCS, reasons necessitating out-of-home care (e.g., domestic violence) are not part of the coding system and may have been coded under other types of maltreatment (e.g., emotional neglect), potentially inflating the prevalence. Further, missing data on the NEPSY reduced the sample size for the moderation model; results were not missing at random in that children whose mothers reported lower education

were less likely to have participated in the EF test. Therefore, results may be less applicable for children with lower educated caregivers. Lastly, results may be less generalizable to more racially or ethnically diverse samples. Despite these limitations, the study was adequately powered to explore the moderating role of EF in the context of polyvictimization and externalizing problems.

Future directions

Future research can build upon such findings to explore the trajectories of children at highest risk due to lower EF skills, such as conducting longitudinal analyses to explore how baseline lower EF and attention skills predict children's well-being over time. Intervention programs that target EF skills may be critical for polyvictimized children and may mitigate the likelihood of developing externalizing problems, thus increasing the likelihood of healthier trajectories for these children across the lifespan.

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Figure 1.
Hypothesized mediation and moderation models.

Figure 2.
Conditional effects of Polyvictimization $\times$ EF on Externalizing Problems.

Table 1.

Descriptive statistics for the maltreatment variables.

Maltreatment type	Number of children	Percent of incidence
Physical abuse	24	27.3
Sexual abuse	20	22.7
Physical neglect	70	79.5
Supervisory neglect	78	88.6
Emotional maltreatment	80	90.9
Polyvictimization rates		
One maltreatment type	4	4.5
Two maltreatment types	20	22.7
Three maltreatment types	34	38.6
Four maltreatment types	24	27.3
Five maltreatment types	6	6.8

Table 2.

Zero-order correlations among the variables.

	Variable	1	2	3	4	5	6	7	8
1	Age	-	.09	-.08	-.01	.09	.12	.16	.15
2	Gender	-	-	.05	.06	-.01	.07	.32*	.14
3	Maternal education	-	-	-	.14	-.13	.01	.03	.01
4	Household income	-	-	-	-	.13	.30	-.07	.09
5	Number of transitions	-	-	-	-	-	.09	-.18	.11
6	Externalizing Problems	-	-	-	-	-	-	-.13	.16
7	EF NEPSY Score	-	-	-	-	-	-	-	.09
8	Polyvictimization	-	-	-	-	-	-	-	-

*
 $p < .001$

Table 3.

Conditional effects of polyvictimization on externalizing problems at different levels of executive function.

Executive function value	β (SE)		
	Polyvictimization on externalizing	<i>p</i>	95% CI
One <i>SD</i> below the mean (78.09)	1.061 (.423)	0.012	[0.236–2.001]
At the mean (<i>M</i> = 93.11)	0.468 (.265)	0.078	[–0.074–1.011]
One <i>SD</i> above the mean (108.13)	–0.125 (.367)	0.732	[–0.920–0.558]