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The bully-victim overlap and nutrition among school-aged youth in North America and Europe

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ABSTRACT

Bullying behavior and its consequences is a public health issue of significant concern, due to the wide range of deleterious health, mental health, behavioral, and psychosocial problems identified among adolescent bully victims. Even so, the role of dietary behaviors in bullying and bully victimization remains unclear. Our objective was to examine the associations between dietary patterns among youth, bully perpetration, and bully victimization. We employed a cross-national study of approximately 150,000 youths, aged 10–16, from 40 different countries with complete information about bully victimization, perpetration, and a number of dietary items reflecting three different nutritional dimensions – health food consumption, junk food consumption, and meal deprivation. The findings indicate that health food consumption, junk food consumption, and meal deprivation were significantly associated with bully *perpetration*, regardless of whether bullying co-occurred with victimization (*low health food consumption*: OR = 1.24, CI = 1.19–1.30; *high junk food consumption*: OR = 1.66, CI = 1.60–1.73; *frequent meal deprivation*: OR = 1.48, CI = 1.42–1.54). Even so, none of the three dietary dimensions were associated with significant changes in the odds of bully *victimization* in the absence of perpetration. Ultimately, the predicted probability of being a bully more than doubles among youths reporting all three dimensions of nutritional risk, relative to youths reporting none. We propose that early dietary interventions among youth that diminish hunger and improve eating behaviors among at-risk populations may help to reduce the prevalence of bullying and its negative sequelae.

1. Introduction

Adolescent bullying is a form of peer-to-peer aggression that often occurs in the school setting and is predicated on an imbalance of power between the perpetrator and the victim (Olweus, 2013). Although bullying has been widely studied (Modecki, Minchin, Harbaugh, Guerra, & Runions, 2014), the significance of bullying behavior and its consequences has dramatically risen in the past decade due to the wide range of deleterious health, mental health, behavioral, and psychosocial problems experienced by bully victims (Feder, 2007; Ng & Tsang, 2008; Östberg, Modin, & Låftman, 2018; Reijntjes et al., 2011; Van Geel, Vedder, & Tanilon, 2014). Additionally, research has indicated that school bullying is a predictor of multiple forms of aggression and/or violence later in life (Ttofi, Farrington, & Lösel, 2012), particularly for males (Renda, Vassallo, & Edwards, 2011). Despite the body of evidence highlighting the various risks incurred for both perpetrators and victims as a result of bullying, the etiology of bullying itself remains somewhat elusive.

One set of factors that might underpin bullying behaviors that are generally left unexplored are nutritional factors. A long-standing body of research points to the role of malnutrition and poor diet quality in the development of antisocial and aggressive behavior more generally (Jackson, 2016; Jackson & Vaughn, 2017; Liu, Raine, Venables, & Mednick, 2004; Raine, Mellingen, Liu, Venables, & Mednick, 2003). The hypothesized theoretical mechanism linking poor nutrition to these forms of behavior is via the impact it may exert on frontal systems of executive governance that result in the (in)ability to regulate cognitive or emotional impulses (Nyaradi et al., 2014; Wills, Isasi, Mendoza, & Ainette, 2007). From a developmental standpoint, these systems may be particularly sensitive to nutrient deprivation stemming from poor diet quality. If prior research and theory reveal a connection between poor nutrition and aggressive and antisocial behavior, then a major constituent component of aggression, namely bullying behavior, should also be tied to dietary patterns. Consistent with this line of theorizing, multiple studies have found a positive relationship between poor impulse control and bully perpetration (Coolidge, DenBoer, & Segal, 2004; Moon & Alarid, 2015).

The present study takes advantage of a unique data source, the

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Health Behavior in School-Aged Children (HBSC), 2009/2010 and carefully examines multiple nutritional factors and the bully-victim nexus in a large and internationally diverse sample. Given prior research that links nutritional factors to aggressive and antisocial behaviors (Jackson, 2016; Jackson & Vaughn, 2017; Liu et al., 2004; Oddy et al., 2009; Raine et al., 2003), we propose that dietary patterns might also be associated with bully perpetration and/or bully victimization among school-aged youth. We hypothesize that bully perpetration will not only be associated with these forms of poor diet quality but that a severity-based gradient (the poorer the diet, the greater the bullying) will exist. Conversely, we suggest that bully victimization *in the absence of bully perpetration* will not be associated with poor diet quality. Examining dietary factors and their associations with bullying is worthwhile, as strategies designed to improve diet quality among youth may have the added benefit of reducing the likelihood of bullying and its negative sequelae.

2. The underpinnings of bullying: findings from the literature

As previously noted, the harmful effects of repeated bully victimization are well-documented (Feder, 2007; Ng & Tsang, 2008; Östberg et al., 2018; Reijntjes et al., 2011; Van Geel et al., 2014). In light of the numerous negative consequences of bullying for victims, continued investigation into the underpinnings of bullying remains a top priority for both violence and health scholars. The bulk of the literature to date on the risk factors for bullying point to various individual (e.g., low self-control, biological sex), familial (e.g., family strain, parental withdrawal, low parental monitoring/communication), school (e.g., classroom collective efficacy, school climate), and community (e.g., neighborhood safety, socioeconomic indicators) factors as predictors of bullying behaviors. In terms of individual factors, research has indicated that male children (Álvarez-García, García, & Núñez, 2015) and children with lower levels of self-control (Chui & Chan, 2013; Moon & Alarid, 2015) are more likely to engage in bullying behaviors. For instance, a recent study by Moon and Alarid (2015) revealed that youth were more likely to physically and psychologically bully other youths when they had lower levels of self-control (see also Chui & Chan, 2013). Furthermore, Unnever and Cornell (2003) found that ADHD, which is closely linked to low self-control, also constitutes an important risk factor for bully perpetration. Additionally, research suggests that familial factors such as parental withdrawal and low parental monitoring might also increase the likelihood of bullying. To illustrate, Shetgiri, Lin, Avila, and Flores (2012) found that the children of parents who felt angry with or bothered by their child, or felt that their child was hard to care for, were more likely to bully other children regularly. Spriggs, Iannotti, Nansel, and Haynie (2007), moreover, found that youths who felt that communicating with their parents was relatively easy were less likely to enact bullying behaviors, suggesting that the quality of the parent-child relationship may be linked to bullying behaviors. Parental supervision also appears to decrease the likelihood of youth involvement in bullying (see Low & Espelage, 2013; Moon & Alarid, 2015).

School factors also appear to influence the frequency of bully perpetration and victimization. For instance, a study by Sapouna (2010) revealed that collective efficacy at the class-level (i.e., social cohesion and informal social control) was protective against bullying behaviors in the classroom. Relatedly, research has also indicated that a negative school environment, as measured by the disorderliness and disruption in the school environment, is associated with increases in the likelihood of bullying (Moon & Alarid, 2015). Finally, community-level factors can also influence the likelihood of children and youths engaging in bullying behaviors. For example, children who reside in neighborhoods characterized by contentious interactions or problems between neighbors were at higher risk of engaging in bullying (Bowes et al., 2009). Similarly, children residing in neighborhoods where residents generally do not feel safe are also more likely to victimize their peers in the form of bullying (Espelage, Bosworth, & Simon, 2000). Ultimately, the research has pointed to a cluster of factors across multiple levels of analysis that are associated with an increased risk of involvement in bullying. Even so, Álvarez-García et al. (2015) noted in their recent, comprehensive review of the topic that the factors that underpin bullying are "still under discussion" and "deserve to be investigated in more depth" (p. 134).

3. Aggressive and violent behaviors: the role of nutrition

A growing number of studies have indicated that nutritional factors are predictive of various externalizing, aggressive, and violent behaviors, many of which have features in common with bullying (e.g., see Gesch, 2013; Jackson, 2016; Jackson & Vaughn, 2017; Liu et al., 2004; Oddy et al., 2009; Raine et al., 2003). For instance, a recent study of a large sample of kindergarten-aged twins in the U.S. indicated that, even after accounting for shared genetic and environmental factors, twins who engaged in poorer dietary practices were significantly more likely to exhibit externalizing and aggressive behaviors during elementary school than their co-twin (Jackson, 2016). Another study of an Australian sample of over 1300 young adolescents (age 14) revealed that the odds of aggressive and/or delinquent behaviors were 160% higher among adolescents who exhibited western dietary patterns (i.e., high junk food, few fruits and vegetables) relative to those who exhibited healthier dietary patterns (Oddy et al., 2009).

Studies examining hunger and malnutrition with longer follow-up periods and distinct samples appear to yield similar results. For instance, Liu et al. (2004) found that children from the Republic of Mauritius who exhibited signs of malnutrition at age 3 were significantly more aggressive and hyperactive at age 8, engaged in significantly more externalizing behaviors at age 11, and exhibited more signs of conduct disorder at age 17 (for a similar study of children in Barbados, see Galler et al., 2011). Recent research has also indicated that children residing in homes with diminished access to a healthy variety of foods are also at greater risk of various acts of misconduct by the age of 13, including cheating, stealing, fighting, and lying (Jackson & Vaughn, 2017). A similar study with a longer follow-up period revealed that frequent hunger and food neglect during childhood predict impulse control deficits and acts of interpersonal violence (e.g., hit people, thrown objects at people) during adulthood (Vaughn, Salas-Wright, Naeger, Huang, & Piquero, 2016).

Recent research has also indicated that children who engage in delinquent behaviors, which often correlate with bullying (see Barker, Arseneault, Brendgen, Fontaine, & Maughan, 2008; Bender & Lösel, 2011), are also more likely to have unmet nutritional needs. For instance, one study revealed that children who are persistently subjected to a lack of household foods (i.e., persistent food insecurity) are significantly more likely to exhibit a number of delinquent behaviors (e.g., violence, illicit substance use) by the age of 9 or 10 (Jackson, Newsome, Vaughn, & Johnson, 2018). Additional randomized-control trials examining nutritional deficits in correctional populations have also been conducted. For instance, research by Gesch (2013) employing a double-blind randomized control trial of 231 violent young adult prisoners (ages 18–21) has examined the influence of nutritional supplements on acts of misconduct in a correctional setting. The results indicate active consumption of the supplements for at least 2 weeks corresponded to a 37% reduction in the most serious offenses, including violence (see Gesch, 2013), suggesting that dietary improvements may help to curb antisocial tendencies.

Overall, the results are quite consistent in their support for the role of nutrition in various aggressive, externalizing, and antisocial behaviors. Proposed explanations of the links between nutritional deficits and antisocial and violent behaviors typically involve deficiencies in brain-based self-control, which has been linked to aggressive and violent conduct in prior research (see Jackson & Beaver, 2013). For instance, Vaughn et al. (2016) found that exposure to frequent hunger was predictive of subsequent impulse control deficits, which in turn