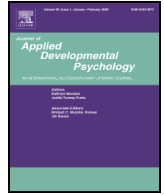


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Declines in efficacy of anti-bullying programs among older adolescents: Theory and a three-level meta-analysis[☆]

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ABSTRACT

Highly visible tragedies in high schools thought to involve bullying have directly contributed to public support for state-mandated K-12 anti-bullying programming. But are existing programs actually effective for these older adolescents? This paper first outlines theoretical considerations, including developmental changes in (a) the manifestation of bullying, (b) the underlying causes of bullying, and (c) the efficacy of domain-general behavior-change tactics. This review leads to the prediction of a discontinuity in program efficacy among older adolescents. The paper then reports a novel meta-analysis of studies that administered the same program to multiple age groups and measured levels of bullying ($k = 19$, with 72 effect sizes). By conducting a hierarchical meta-analysis of the within-study moderation of efficacy by age, more precise estimates of age-related trends were possible. Results were consistent with theory in that whereas bullying appears to be effectively prevented in 7th grade and below, in 8th grade and beyond there is a sharp drop to an average of zero. This finding contradicts past meta-analyses that used between-study tests of moderation. This paper provides a basis for a theory of age-related moderation of program effects that may generalize to other domains. The findings also suggest the more general need for caution when interpreting between-study meta-analytic moderation results.

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Bullying is an aggressive act in which one or more individuals with relatively higher social power systematically and intentionally cause harm to an individual with relatively lower-power (Olweus, 1993). By now, the data are quite clear that victims of bullying suffer in terms of their social, emotional, academic, and physical development (Cook, Williams, Guerra, Kim, & Sadek, 2010; Copeland et al., 2014; Reijntjes, Kamphuis, Prinzie, & Telch, 2010; Reijntjes et al., 2011; Ttofi, Farrington, Los el, & Loeber, 2011). The harm of victimization alone is reason for public action against bullying. But in the past decade and a half, there have also been a number of high-profile shootings and suicides carried out by older adolescents in high schools. Popular media interpretations have emphasized the role of bullying in these events (Gibbs, 2010; Grossman, 2009). It is unclear to what extent bullying actually contributes to such rare, extreme tragedies, but it is clear that such events have galvanized public support for laws requiring school-wide K-12 anti-bullying programs (Bierman, 2010; School Bullying Prohibited: Bullying Prevention Plan Act, 2010). However, do existing programs work among older adolescents, the age when many of the most visible tragedies have occurred?

Recent meta-analyses of past anti-bullying interventions have suggested that, although there is some notable variability across nations

and types of programs, “on average, anti-bullying campaigns have had some modest success” (Smith, 2011, p. 419; for null effects, see Merrell, Gueldner, Ross, & Isava, 2008; for evidence that programs are only effective in European countries, see Evans, Fraser, & Cotter, 2014; for modest positive effects, see Smith, Schneider, Smith, & Ananiadou, 2004; Ttofi & Farrington, 2011). Since past meta-analyses aggregated many studies conducted with many different grade levels, it has further been possible to conduct “meta-regression” analyses to test whether existing programs are more or less effective for older adolescents. In one of the most recent and comprehensive meta-analyses, a meta-regression produced a significant *positive* effect of grade level (Ttofi & Farrington, 2011), leading the authors to conclude that “programs should be targeted on children aged 11 years or older rather than on younger children” (p. 46). Thus, based on the published record, policymakers may have been justified in requiring older adolescents to receive anti-bullying programs.

However, evaluations of best-practices anti-bullying programs involving tens of thousands of adolescents sometimes show the opposite pattern: modest effects for younger children, and null effects for older adolescents (K arn a, Voeten, Little, Alanen, et al., 2011). Indeed, theory and data in developmental psychology might lead one to predict this

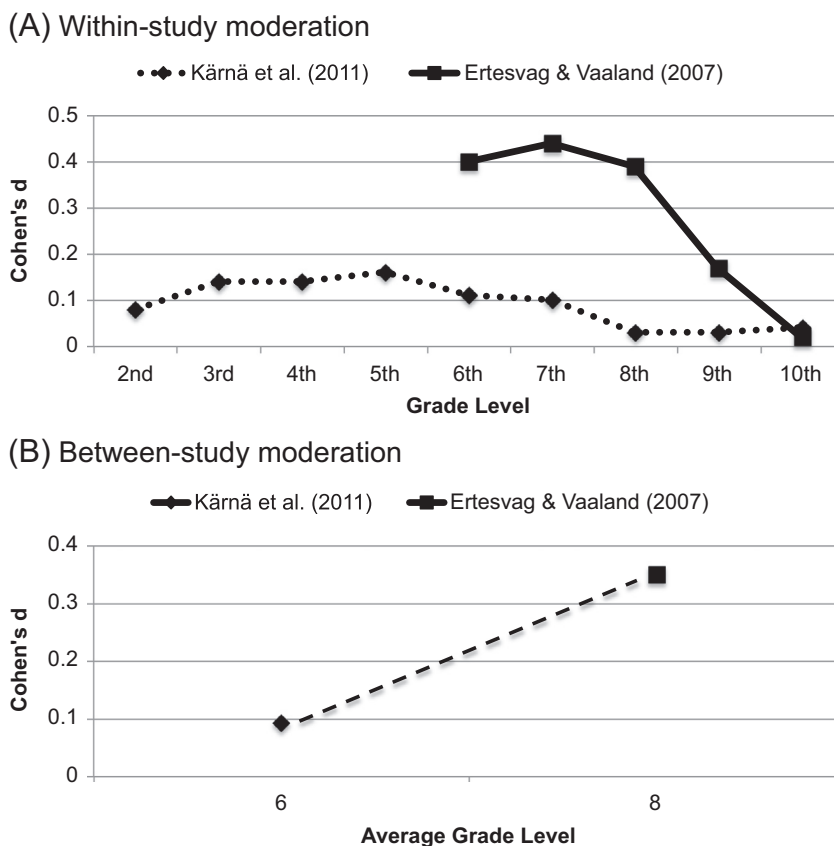


Fig. 1. Very simplified illustration that (A) within-study and (B) between-study moderation tests in meta-analyses can produce age-related trends in the opposite direction. Panel (A) clearly shows a decline to zero in efficacy among high school students, whereas Panel (B) shows an increase with age. Studies were cherry-picked to more clearly illustrate the potential for the two techniques to produce opposite developmental trends; see Figs. 4 and 5 for all effects from all studies. Grade levels were converted to United States grade levels for comparability.

Table 1
Reasons to expect developmental differences in adolescent behavior change program efficacy.

Developmental differences	Explanation for differential intervention efficacy	Application to bullying prevention
1. Changes in manifestation of problematic behavior	The manifestation of the behavior targeted by the intervention occurs at less problematic levels at later developmental stages; other manifestations reach more problematic levels.	Across adolescence, directly observable forms of aggression/bullying (hitting or insulting) become less prevalent than more indirect forms of aggression/bullying (rumors or exclusion).
2. Changes in underlying causes of the problematic behavior	With age, a causal antecedent of a problematic behavior may become less influential, and so interventions addressing that antecedent could be less effective.	Bullying interventions that are effective for younger children may be addressing causes of bullying that are less relevant for older adolescents.
Social skills	The self-regulatory or social skills required to refrain from a problematic behavior at one age may differ from those required at a later age.	Bullying may be caused by poorer social skills among younger children, but among older adolescents these skills may facilitate indirect forms of bullying (e.g. exclusion/spreading rumors).
Motives or beliefs	The motives and beliefs that contribute to a behavior at an older age may differ from those that matter at a younger age.	Older adolescents may become more motivated to demonstrate social status than at younger ages.
Settings	The social structure of the environment or the available choices can differ at later ages.	Educational transitions, such as the transition to high school, can shuffle friendship networks; this may create a greater concern about social relationships and therefore conformity to peers. Also older adolescents may have greater access to technology, making it easier for them to engage in online forms of bullying.
3. Changes in the efficacy of domain-general behavior-change techniques	Techniques for changing behavior among younger children may not compel older adolescents.	Bullying program elements—direct instruction, role-playing, school assemblies—may be less effective in high school than in elementary school.
Building social skills	Older adolescents may resent the implication that they lack basic social or emotional skills.	Among older adolescents it may be more important to make skill-building non-stigmatizing and non-remedial—i.e., an honorific program to create materials that will benefit younger students.
Changing motives or beliefs	Older adolescents may resist adults' transparent attempts to control what feels like a personal choice (beliefs, motives); they may require a more indirect approach.	Among older adolescents, it may be more important to utilize autonomy-supportive persuasive tactics (i.e., self-persuasion, descriptive norms) and language ("you might" instead of "you should").
Adjusting settings	Detailed systems of reward and punishment may be less effective later in adolescence, while "nudge" approaches—which change choice architecture and avoid explicit persuasion—may be increasingly effective.	Among older adolescents, bullying behavior may be difficult to spot and may rapidly change with technology; so policies that directly forbid certain bullying behaviors may become quickly outdated.

very pattern of results. There are developmental changes in the form of bullying (physical vs. relational; United States Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, 2009, 2011), the characteristics of those who bully (Cook et al., 2010), and the underlying psychological causes of bullying (Cohen & Prinstein, 2006; Cook et al., 2010; Faris & Felmlee, 2011; Guerra, Williams, & Sadek, 2011). Furthermore, there may be a domain-general developmental decline in standard techniques for behavior change, perhaps due to increases in reactance against adults' direct injunctions to think, feel, or behave in a way sanctioned by adults (Brehm, 1966; Erikson, 1968; Hasebe, Nucci, & Nucci, 2004; also see Larson, Wilson, Brown, Furstenberg, & Verma, 2002; Lapsley & Yeager, 2012; Nucci, 1996).

Past meta-analyses may also have been misleading because they suffered from a methodological limitation. They involved *between-study* comparisons of age-related effectiveness, rather than aggregating *within-study* tests of moderation (see Ferguson, San Miguel, Kilburn, & Sanchez, 2007; Smith, Salmivalli, & Cowie, 2012). The potential for between-study tests of moderation to mislead meta-analysts has been well-documented by statistical experts (Cooper, 2009; Cooper & Patall, 2009; also see Lambert, Sutton, Abrams, & Jones, 2002; Olkin & Sampson, 1998). Within-study analyses allow for a comparison of the same content delivered at different ages, reducing confounds and increasing precision of age-related estimates. Between-study effects, however, average the ages of all students in a study. For example, in a between-study moderation analysis, an intervention administered to students in 2nd grade and 10th grade would be treated as an effect size for 6th grade students, (see, e.g., Fig. 1. This can mask real age-related trends. Fig. 1 shows a very simplified comparison to illustrate this. It shows how even though both studies may show negative slopes across grade levels, in the between-study analysis a study with a lower average age and lower average effect size could produce a misleading, positive age-related slope.

The present paper reviews the potential for developmental differences in the efficacy of anti-bullying programs. Part 1 reviews the available evidence in developmental psychology that might lead to the expectation of declines in existing program effect sizes across

grade levels, the opposite of the age trend found in Ttofi and Farrington's (2011) meta-analysis. Next, Part 2 reports a novel meta-analysis that assesses whether the findings from past intervention studies—when analyzed using within-study moderation tests—indeed show patterns across grade levels that conform to theoretical expectations. Finally, the paper discusses implications for future research.

Part 1: Theoretical expectations

Overview

What developmental differences could undermine the efficacy of school-based programs? There are at least three considerations. These could be relevant to any attempt to reduce a societally-undesirable behavior, not only anti-bullying programs. See Table 1.

First, the base rate of the *form* of the problematic behavior could change with development, creating a moving target for intervention.

Second, the *underlying causes* of a problematic behavior could change.

Third, *domain-general behavior-change techniques* might be differentially effective across development. Techniques such as explicit classroom instruction in interpersonal skills or whole-school assemblies have been used to address a number of social problems, including substance abuse, childhood obesity, and of course bullying. Yet features of adolescence—such as a growing concern for autonomy or the increasing influence of the peer group—may undermine such strategies to the extent that they rely on adult authority. While not unique to bullying programs, differential effectiveness of these domain-general techniques may nevertheless be one reason to expect moderation by age in bullying program effect sizes.

In what follows, we discuss how each of these three developmental changes could, in theory, reduce treatment effect sizes (also see Table 1). Our organization of these ideas is new, but many of the arguments have appeared in some form elsewhere (e.g., Björkqvist, Lagerspetz, & Kaukiainen, 1992; Ellis et al., 2012; Hawley, Stump, & Ratliff, 2010; Heilbron & Prinstein, 2008; Juvonen & Graham, 2014;

Sutton, Smith, & Swettenham, 1999; Volk, Camilleri, Dane, & Marini, 2012). We note however that our review cannot definitively say whether a given concern is a cause of reduced effect sizes for a given program. In part this is because null or inconsistent results are notoriously hard to interpret (De Los Reyes & Kazdin, 2008). It is also often not possible to fully describe the student experience in past interventions. Interventions are often described at a high level of abstraction, or materials themselves were not publicly available. In addition, formal scripts or lessons cannot capture the full, lived experiences of participants—for instance, whether the materials were subjectively compelling and persuasive, or not—something that is well known in research on treatment heterogeneity (Weiss, Bloom, & Brock, 2012). Thus, the section below constitutes theoretical possibilities.

Changes in the form of bullying

First, if high school anti-bullying interventions seek to change behaviors that are less prevalent in that age range, this could potentially attenuate treatment effect sizes in these older age groups. A number of past scholars have stated or demonstrated that, with development, direct, observable aggression such as hitting, slapping, pushing, or calling someone names declines as a proportion of bullying, whereas indirect, less observable aggression such as social exclusion or starting rumors increases as a proportion of bullying (e.g., Björkqvist et al., 1992; Coie & Dodge, 1998; Dodge, Coie, & Lynam, 2006; Tremblay, 2010; also see qualitative research by Guerra et al., 2011). Illustrating this possible trend, one participant in pilot research conducted for Yeager, Trzesniewski, and Dweck's (2013) study said:

“Our high school isn't like any school in the movies. Jocks don't throw freshmen into the trashcan, or dunk nerds' heads into the toilet. Bullies aren't people who punish physically, but are mostly just people who ignore and exclude others.”

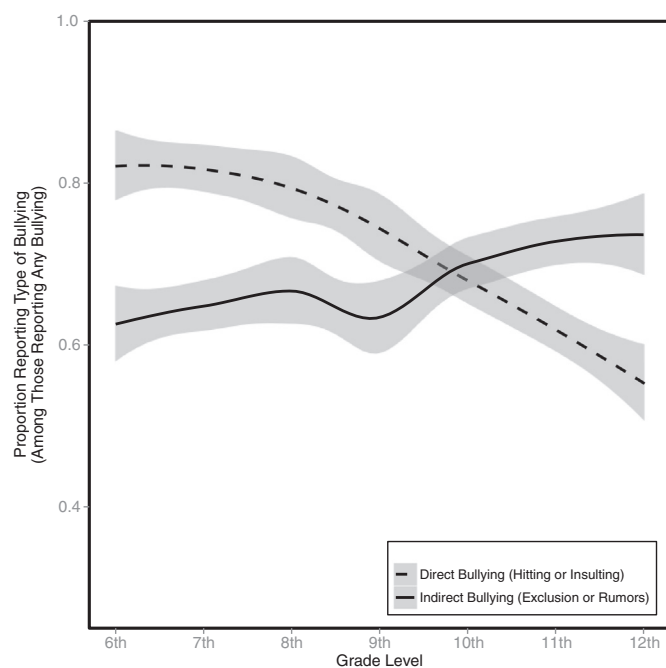


Fig. 2. The form of bullying changes across development: Evidence from a nationally-representative sample. Note: Values reflect answers to survey questions asking students to report whether they were the victims of bullying. Loess smoothing curves. Gray areas represent 1 standard error of the mean at a given grade level. Each line's slope is significantly different from zero and from each other at $p < .001$. Excludes students who reported not being bullied.

Source: Authors' analyses of the aggregated 2009 and 2011 United States National Crime and Victimization Survey (NCVS).

Guerra et al. (2011) conducted a more systematic qualitative inquiry by using focus groups in elementary school and high school. For younger children, bullying was seen by children as when a person is “wrecking your stuff” or “kicking” you, whereas older adolescents “focused more on getting and keeping power and not letting ‘perfect’ kids get too full of themselves” (p. 305).

These trends also appeared quantitatively in the findings from Volk, Craig, Boyce, and King (2006), who analyzed large-scale representative sample data from Canada (the 1998 Health Behavior in School-Aged Children survey). They showed that direct, physical assault forms of aggression declined dramatically from age 13 to 16.

Building on this, we used a large representative sample to examine more directly the question of whether direct forms of bullying (insulting or hitting) decline as a proportion of bullying whereas indirect forms (exclusion or rumors) increase. We re-analyzed the United States federal government's School Crime Supplement of the National Crime and Victimization Survey, which uses probability-sampling methods and involves many thousands of students (United States Department of Justice, Office of Justice Programs, Bureau of Justice Statistics, 2009; 2011). We aggregated data from two surveys, conducted in 2009 and 2011, to ensure robustness. For greater detail about the sample, survey questions, and analyses, see Appendix A in the online supplemental material.

Looking at the sub-set of students who reported being the victim of bullying, Fig. 2 shows that reports of being the victim of direct, observable aggression declined from roughly 80% of bullying in 6th grade to just over 50% by 12th grade (almost perfectly replicating analyses of a different dataset by Volk et al., 2006). In a logistic regression predicting direct bullying with age, this was a significant linear decrease, odds ratio = .78, $Z = 10.12$, $p < .001$. Meanwhile, extending past research, reports of being the victim of indirect, less observable aggression increased from just over 60% of bullying in 6th grade to roughly 75% of bullying by 12th grade, a significant linear increase, odds ratio = 1.10, $Z = 4.23$, $p < .001$. These two developmental trends were significantly different from each other in a multivariate regression, Wald test of equality of coefficients, $F(1, 2824) = 90.63$, $p < .001$. Thus, in these analyses, exclusion/rumors catch up to and then overtake hitting/insults as the leading type of bullying in high school (Fig. 2).

Furthermore, a large amount of research has documented that bullying and victimization related to sexual relationships or sexual orientation increase with development, spiking in 9th grade (e.g. Pepler et al., 2006). As adolescents age and complete puberty, they are increasingly likely to engage in aggression against individuals they deem to be competitors for sexual partners (Vaillancourt, Miller, & Sharma, 2010), or against individuals who do not conform to traditional gender roles (Hong, Espelage, & Kral, 2011).

Altogether, one might expect weaker effects on the overall prevalence of bullying or victimization with age if an intervention was more successful at reducing direct, observable forms of aggression than more indirect, unobservable forms or sexuality-related victimization.

Changes in the underlying causes of bullying

Next, the underlying causes of bullying could change across development. That is, the strength of a relation between a causal antecedent and bullying could become weaker or stronger as children become adolescents. Types of causes that could change are social competence, motives, and settings. To illustrate this point, we emphasize the first two here (also see Table 1).

Social competence

Is bullying caused by a deficit of social competence or by a misguided surfeit of social intelligence? A number of scholars have questioned the accuracy of the popular stereotype of the “bully”—that is, a low-intelligence, socially-incompetent physically-aggressive person (Sutton et al., 1999). Instead, emphasis has been placed on the view

that bullying is perpetrated by individuals who are effective at manipulating the feelings of others in order to attain social status—something that requires great social savvy to carry out without getting caught (Garandeau & Cillessen, 2006; Sutton et al., 1999). Which view is correct?

It is possible that both stereotypes have some truth to them, but to a greater or lesser extent at different ages.¹ (cf. Hawley, 2011; Sutton et al., 1999) A large amount of research on young children has found a negative correlation between social and emotional competence and a child's tendency to bully others (Cook et al., 2010; Copeland, Wolke, Angold, & Costello, 2013; Espelage, Bosworth, & Simon, 2001). Meta-analyses of many past studies demonstrated that, among younger children in elementary school and sometimes earlier in middle school, bullying is predicted by lower social influence, poorer social perspective-taking and social problem solving, poorer impulse control, low academic achievement, a poor home environment and other deficits (Cook et al., 2010; also see Caravita, Di Blasio, & Salmivalli, 2009; Espelage, Low, Rao, Hong, & Little, 2014). And so designing interventions that seek to remediate deficits in these areas might be expected to benefit children's ability to control or change their bullying behavior. And indeed, it is common for interventions remediating social skills to have positive effects on both aggressive behavior and adjustment more generally among younger age groups (Brown, Low, Smith, & Haggerty, 2011; Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011).

These same correlations, however, become markedly different at later ages. A meta-analytic synthesis by Cook et al. (2010) found that age moderated the relation between bullying others and adjustment. Among children (age 3–11 years) popularity was a strong and significant *negative* predictor of bullying, but among older adolescents (age 12–18 years), popularity was a significantly weaker, non-significant, predictor of bullying others (Cook et al., 2010). Data from individual studies show that the negative relation between popularity and bullying reverses sign and becomes gradually more strongly positive (see a narrative review by Heilbron & Prinstein, 2008). Rose, Swenson, and Waller (2004) found that popularity negatively predicted indirect, social bullying in 3rd grade (at $r = -.15$), but positively later: in 7th grade $r = .27$, in 9th grade $r = .39$ (also see Cillessen & Mayeux, 2004).

Some data show that the moderate-to-high popular students (but not the *most* popular students) may be driving these trends. Faris and Felmlee (2011; 2012) conducted social network analyses to discern levels of popularity (specifically, “network centrality”). The authors found that in high school the students who most frequently bullied others were not socially maladjusted or unpopular but were approximately between the 75th and 93rd percentiles in terms of popularity (Faris & Felmlee, 2012). That is, it was not a small sub-set of students with low empathy, poor perspective-taking or few friends who bullied others. Instead, bullying was carried out by a large group of mostly normal teens who had reasonable numbers of friends and some level of popularity but presumably desired more.

Finally, among younger children, externalizing behaviors are more likely to be co-morbid with bullying than among older adolescents (Cook et al., 2010). Said another way, among younger children, bullying was likely to be a correlate of a host of self-regulatory and social difficulties, whereas later in adolescence this was less true. For instance, Caravita et al. (2009) showed that among older adolescents *higher* levels of “cognitive empathy” predicted *more* bullying, but not among younger children. This again suggests that later in development bullying others is less of an indicator of deficits in social skills, and more of a signal of the presence of strong interpersonal skills that are applied to harm others.

¹ Note that although here we focus on average trends, it is of course the case that at all age groups there will be individual students who do not fit the average description—i.e. socially-savvy young children who bully and physically-bullying older adolescents (for the former, see, e.g., Farmer et al., 2010). Person-centered analyses can be helpful in identifying relatively-uncommon sub-groups across development (Hawley et al., 2010).

What accounts for this developmental shift in the correlations of social competence with bullying? Recall that the form of bullying changes with development—moving from more overt forms (hitting/insulting) to more covert forms (exclusion or spreading rumors). And these differential behaviors require different sets of skills to carry out successfully—the former relying more on physical strength, and the latter on sufficient savvy to maximize the benefits for one's popularity of harming others, while minimizing the potential for retribution from peers, adults, or potential sexual partners. Andreou (2006) documented that overt aggression was predicted by a *lack* of strong social skills, whereas more covert forms of aggression were predicted by the *presence* of strong social skills (also see Kaukiainen et al., 1999). In general, deploying social, indirect bullying strategically requires advanced social skills and self-regulation. These are typically not fully developed in early childhood or early adolescence, but become more mature later in adolescence.

This raises several possibilities regarding age differences in the effects of anti-bullying programs. First, attempting to remediate social skills should have positive effects for younger children and, to the extent that those skills facilitate more effective bullying, null or potentially even iatrogenic effects for older adolescents may be expected (see Sutton et al., 1999). Second, many of the most successful programs involve training in bystander intervention (e.g., Kärnä, Voeten, Little, Alanen, et al., 2011). But if society has given students a misleading stereotype of a low-intelligence, socially-unskilled “bully,” students may not construe savvy, subtly socially-dominant behavior among moderate-popularity peers as “bullying” and may not speak up.

Finally, it is of course possible for interventions to remediate social competence in early childhood and then reduce aggression later in life. For instance, interventions sometimes involve changing attributions about the ambiguous intent of others who might be harming a person—that is, the hostile attributional bias (Dodge, 2006; Hudley & Graham, 1993). Dodge, Godwin, and The Conduct Problems Prevention Research Group (2013) tested this among a group of students that was pre-selected to be likely to demonstrate anti-social behavior including physical aggression. Addressing social-cognitive deficits in kindergarten led to reductions in anti-social behavior until at least 9th grade. Thus, among students that were selected to be likely to physically bully, social skills may have been a cause of physical bullying. Yet as noted physical bullying comprises a relatively smaller proportion of bullying later in high school as compared to earlier in childhood. The approach was not tested among adolescents who had strong social competence but may be at risk for more social aggression.

Motives

Motives for bullying may also vary across age groups, and this may cause age-related differences in anti-bullying program treatment effects. First, a number of biological and cognitive changes are occurring during adolescence that are thought to create differences in social motivation (Crone & Dahl, 2012; Somerville, Jones, & Casey, 2010; Steinberg, 2014). recent neuroendocrine and social-affective neuroscientific research has pointed to the onset of puberty and its concomitant surge in testosterone levels as factors that contribute to an appetitive desire for social status (Crone & Dahl, 2012). According to this perspective, adolescents can be characterized by desire for high-intensity behaviors that can secure social status (also see Juvonen & Graham, 2014). Engaging in social aggression to demonstrate status—or avoid the loss of social status—may be the result of this puberty-dependent surge in social motivation, rather than, as at earlier ages, a sign of dysfunction.

To the extent that this biological theory is accurate, then it suggests interesting patterns of moderation of bullying intervention efficacy. The size of a treatment effect of traditional anti-bullying programs in middle and high school may correspond to the proportion of adolescents in the

sample that have begun puberty, with smaller effects expected for more-developed adolescents.

Next, contextual changes may coincide with biological and cognitive changes. As adolescents transition to high school, peer groups and friendships become highly unstable (Cairns & Cairns, 1994). Illustrating this, in one study that surveyed 9th graders about their friendships every month for five months, roughly 50% of teenagers' friends were different from one month to the next (Chan & Poulin, 2007). This type of instability can create anxiety about social relationships and signal a new opportunity to improve one's standing and climb to higher levels of peer regard (Juvonen & Graham, 2014). Teens may seek to keep lower-status peers from joining their group, or they may intentionally start rumors about others in order to neutralize peer threats. Both qualitative and survey research illustrate that school transitions can be a "land grab" for status and peer influence (Crosnoe, 2011; Guerra et al., 2011; see Pellegrini & Long, 2002). To the extent that teens may believe that where the "dust settles" can have long-term implications for their social happiness, teens may be willing to engage even in extreme forms of social aggression to preserve or increase status (Aikins & Litwack, 2011; Caravita & Cillessen, 2012; Cillessen & Mayeux, 2004; Cohen & Prinstein, 2006; Ellis et al., 2012; Faris & Felmlee, 2011; Hawley et al., 2010; Heilbron & Prinstein, 2008; Ryan & Shim, 2008; Sutton et al., 1999; Volk et al., 2012).

This analysis also suggests that individual differences in social cognitions related to the drive for status may be increasingly important as causes of bullying during the transition to high school. That is, a potential threat to social status is not, of itself, a cause of bullying. Instead, that threat must be interpreted by the student in a way that conflicts with their goals (see, e.g. Dodge et al., 2006; Olson & Dweck, 2008). If one's goal is to demonstrate high social status, then having a low-status peer joining one's group could be interpreted as a threat social aggression may be viewed as an effective method for dealing with this threat (Aikins & Litwack, 2011; Caravita & Cillessen, 2012; Cillessen & Mayeux, 2004; Ryan & Shim, 2008; Volk et al., 2012).

Indeed, a growing amount of research is showing that individual differences in *social demonstration goals* (Rodkin, Ryan, Jamison, & Wilson, 2013; Rudolph, Abaied, Flynn, Sugimura, & Agoston, 2011; also see Erdley, Cain, Loomis, Dumas-Hines, & Dweck, 1997) can be powerful predictors of an adolescent's likelihood of engaging in peer aggression. Specifically, teens whose goal is to demonstrate high status to others—that is, those who agree that "It is important to me to have 'cool' friends" or "My goal is to show other kids how much everyone likes me"—are more likely to respond to peer conflicts that threaten their status by resorting to aggression (Rodkin et al., 2013; Rudolph et al., 2011; also see Yeager, Trzesniewski, Tirri, Nokelainen, & Dweck, 2011; Yeager et al., 2013).

Bullying may increasingly be shaped by social cognitions relative to status and popularity. Yet to date, social-cognitive interventions to reduce aggression have not been updated to address social demonstration goals, instead focusing on important factors such as the hostile attribution bias, which have demonstrated efficacy for younger children but less efficacy for older children (Metropolitan Area Child Study Research Group, 2002). Garandeau, Lee, and Salmivalli (2014) found that an intervention with strong overall efficacy had no effect on the most popular children, suggesting that, even in the generally highly-successful KiVa program, the desire to demonstrate and attain social status may not have been fully addressed.

Causes related to sex, sexuality, and race/ethnicity

There are also changes in sexual maturity that could alter both same-sex and cross-sex relationships. Indeed, qualitative work highlights the importance of competition over romantic partners as one cause of girls' bullying in high school. For instance, girls who appear too alluring can be targeted by other girls for intense bullying (see Guerra et al., 2011; also see Vaillancourt et al., 2010). Also, bullying and victimization

increase during later adolescence among gender nonconforming youth (Hong et al., 2011; Horn, Kosciw, & Russell, 2009) and lesbian, gay, or bisexual (LGB) youth (Espelage, Aragon, & Birkett, 2008; Robinson & Espelage, 2012). No evaluated anti-bullying programs address victimization based on sexual orientation and/or gender identity in great depth (Birkett, Espelage, & Koenig, 2009).

Potential declines in efficacy could also be related to race, ethnicity and culture. Although bullying others does not seem to vary significantly by race or ethnicity among adolescents (Hepburn, Azrael, Molnar, & Miller, 2012), ethnic minority and recent immigrant students report higher levels of being victimized by others (Peguero, 2012). One explanation for this is suggested by research conducted by Killen and others (for a review, see Killen, Mulvey, & Hitti, 2012; also see Levy & Killen, 2008). These authors have found that children's reasoning about exclusion based on race continues to develop into adolescence. Specifically, majority group adolescents may use exclusion of out-group members as a method to maintain their own group's status. Race- or ethnicity-based exclusion may not be reduced if an anti-bullying program uses a race-neutral approach that does not address the underlying social-cognitive causes of this exclusion (see Killen et al., 2012). To the extent that some programs used in the U.S. were imported from European countries that are relatively racially homogenous, or from suburban, predominately White areas of the U.S., then these programs may not have included material that sufficiently addresses the underlying causes of group-based exclusion (Evans et al., 2014).

Changes in responsiveness to domain-general behavior-change strategies

Heckman and Kautz (in press) recently reviewed a wide variety of interventions designed to teach social and cognitive skills so as to affect consequential youth outcomes, such as intelligence, personality, health, or crime. These authors uncovered a striking trend. Early childhood interventions routinely seemed to show persistent and widespread effects on multiple domains of development, but interventions delivered later, in adolescence, often had null effects or benefits that quickly diminished. The authors used these data to support the claim that by adolescence certain patterns of behavior might be fixed, and that interventions are best directed toward younger children. Without denying the importance of early intervention, another explanation is possible. Perhaps the optimal delivery mechanism for effective interventions changes in adolescence, making it difficult for studies using traditional delivery mechanisms to have lasting effects. If true, and applied to the present case of anti-bullying programs, then even interventions grounded in accurate theory about the causes of bullying could have no effect or a dampened effect if delivered in developmentally-inappropriate ways. We explore this possibility here (also see Lapsley & Yeager, 2012).

What are the typical delivery mechanisms in anti-bullying programs? An intervention reported by Hanewinkel (2004) was conducted among children in 4th–13th grade (in Germany). It was a "whole school" approach that involved "restructuring the social environment by implementing clear rules against bullying behaviors" (Hanewinkel, 2004, p. 84) as well as direct classroom instruction in which teachers gave lessons about why bullying was bad and should be stopped. These authors found that among high school students this whole-school, rule-based approach increased reports of bullying. Allen (2010) implemented an anti-bullying program for 9th–12th grade that involved school assemblies, class discussion, a social-emotional learning team, and a parent information night. This program increased reports of victimization among 9th graders and did not reduce victimization among 10th to 12th graders (Allen, 2010), although there were some benefits for self-reported bullying. The KiVa program, a whole school model with many different components, uses direct instruction and assesses students' knowledge. It had very consistent benefits for younger children in many large-scale trials, but unfortunately no effect among high school students despite enormous statistical power (Kärnä,

Voeten, Little, Alanen, et al., 2011). Overall, of the interventions in our meta-analysis below, over 70% used whole-school reform, and the large majority involved explicit rules and teacher-delivered curricula.

It is possible that adult-delivered, explicit rules against certain social behaviors, as well as direct instruction in classrooms, can threaten adolescents' autonomy. Indeed, decisions about friendships—decisions about who to hang out with and who to exclude, who to like and who to dislike—are important personal choices (Nucci, Killen, & Smetana, 1996). Infringing on these might trigger adolescents' drive to assert their autonomy and rebel against what they perceive to be adults' attempts to control a personal domain (Erikson, 1968; Hasebe et al., 2004; Nucci et al., 1996; also see Larson et al., 2002). Adolescents commonly express reactance in response to adults' attempts to influence their personal goals (Brehm, 1966; Erikson, 1968; also see Grandpre, Alvaro, Burgoon, Miller, & Hall, 2003; Henriksen, Dauphinee, Wang, & Fortmann, 2006), rejecting adult's suggestions—or even endorsing their opposite—to reassert their autonomy. Indeed, developmental research finds that older adolescents (i.e., age 16), compared to younger children (i.e., age 8–10), increasingly invoke their right to make personal choices and not have them controlled by adults in school (Ruck, Abramovitch, & Keating, 1998).

Experimental work shows that even small changes in how a request is made can trigger reactance or, alternatively, allow an adolescent to feel autonomous while accepting the suggestion. Much of this has grown out of self-determination theory (see Vansteenkiste, Lens, & Deci, 2006). For instance, in some laboratory research, positive feedback about how a student performed (“You did well”) improved motivation to continue in a task, but using controlling language (“You did well, *as you should*”) undermined motivation (Deci, Koestner, & Ryan, 1999). A field experiment with high school students similarly suggested the importance of autonomy for adolescents. When a new activity was presented to teens in less controlling terms (e.g. “You *might* decide to learn more”) as opposed to in more controlling terms (“You *should* decide to learn more”), students processed the information more deeply and were more likely to apply it in their lives a few days later (Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004; also see Reeve, Jang, Carrell, Jeon, & Barch, 2004; Ryan & Deci, 2000; Vansteenkiste et al., 2006).

Although past experiments have not been conducted in bullying prevention, one prominent example—the truth™ campaign—illustrates the power of controlling language to undermine well-intentioned change efforts in public health, as well as the power for autonomy-supportive processes to promote behavior change. In rigorous evaluations, more traditional direct injunctions from adults to “just say no” to smoking was found to ironically *promote* smoking, presumably by triggering the reactance processes described above (Bauer, Johnson, Hopkins, & Brooks, 2000; Farrelly et al., 2002). By contrast, the truth™ anti-smoking campaign is thought to have produced dramatic reductions in teenage smoking rates by depicting non-smoking teens as rebellious and independent for standing up to “Big Tobacco” (e.g., with television commercials in which teens pile body bags outside a tobacco company building while yelling at executives through a megaphone). Some have argued that the key to the truth™ campaign's success relative to the more-controlling “just say no” strategies was its portrayal of tobacco companies as the “authority” seeking to manipulate teens and of non-smoking teens as rebellious in standing up to them (Bauer et al., 2000; Evans et al., 2004). Some developmental experiments explicitly tested the special importance of autonomy in high school as compared to earlier in development. Grandpre et al. (2003) found that telling 10th graders *not* to smoke seemed to *increase* their willingness to try a cigarette, while making suggestions in an autonomy-supportive way (as in “you *might* try” not to smoke or “you *could* try” to say no) seemed to decrease intentions to smoke. Among younger teens in 4th or 7th grade, the controlling versus autonomy-supportive conditions did not differ, suggesting that concerns about autonomy are especially important later in adolescence and perhaps less important earlier in childhood.

Returning to bullying, one possibility is that adults delivering anti-bullying programs might be unintentionally using language that could be construed as controlling (“could,” “should,” or “ought”; or directives such as “don't bully” or “be respectful”) or may be forbidding certain behaviors in a way that insufficiently emphasizes personal choice. This possibility is currently untested, but if it were true, then one might expect smaller effect sizes specifically in high school, the age when teens' concerns about autonomy might be greatest (also see Yeager & Walton, 2011). Supporting these possibilities, it is interesting that a correlational study by Roth, Kanat-Maymon, and Bibi (2011) found that students who reported that their teachers were autonomy-supportive were also less likely to bully peers. In future intervention studies, it would be interesting to code the use of controlling versus autonomy-supportive language in an anti-bullying program and test whether this moderates treatment effects. Finally, approaches that avoid adult control altogether and instead go through peers have had some success among adolescents in high school (see Paluck & Shepherd, 2012).

Summary

This review provided reasons to predict developmental differences in the effects of anti-bullying programs (see Table 1). Programs that seek to reduce direct physical or verbal bullying, remediate basic social skills such as empathy or perspective-taking, and use direct instruction or skill repetition, may well be effective for younger children in elementary school. As adolescents age, however, the forms and causes of bullying may shift, as may the efficacy of domain-general behavior-change strategies (Table 1). As such, strategies that may show modest efficacy for young children could have null or even iatrogenic effects for older adolescents. Of course, we cannot say with certainty that any or all of these possibilities are true of a given past intervention.

A new meta-analysis is needed

Given the possibilities reviewed, it may be surprising that past meta-analyses have shown that anti-bullying programs are more effective for adolescents as compared to children (e.g., Ttofi & Farrington, 2011). Smith et al. (2012) criticized the between-study approach employed in that meta-analysis (Ttofi & Farrington, 2011). Smith et al. (2012) noted that when looking at prominent examples of interventions that delivered the same content to a wide age range, in every case younger children benefitted more than older adolescents (Kärnä, Voeten, Little, Alanen, et al., 2011; Kärnä, Voeten, Little, Poskiparta, et al., 2011; Kärnä et al., 2012; Olweus & Limber, 2010; Smith, 2010). Ttofi and Farrington (2012), in a reply, located eight total studies in which within-study comparisons were available, and conceded that many showed the same trend of a declining effectiveness with age. However, these analyses by Ttofi and Farrington (2012) are limited in a number of important ways. First, they included a small group of studies. The authors did not search for additional examples or contact authors to ask for new calculations of raw data. Second, these analyses did not involve formal statistical tests of the within-study slopes. All told, Ttofi and Farrington (2012) concluded that their age-related data were inconclusive. Both sets of authors called for a new meta-analysis that aggregates effect sizes by age and conducts appropriate statistical tests of this relation (Smith et al., 2012; Ttofi & Farrington, 2012). This is done here.

Part 2: A meta-analysis of within-study age moderation

The second half of the present paper is a novel meta-analysis. This involved calculating an effect size for each age group in each relevant study that appeared in past meta-analyses, in addition to inclusion of new studies that were published in the time since the previous meta-analyses stopped collecting data. For statistical analyses, we build on recent advances in three-level meta-analysis (Cheung, in press; Konstantopoulos, 2011; Marsh, Bornmann, Mutz, Daniel, &

O'Mara, 2009; Van den Noortgate, López-López, Marín-Martínez, & Sánchez-Meca, 2012). Cheung (2014) explains that traditional meta-analyses can be considered two-level models with participants at level 1 and the studies at level 2, whereas three-level meta-analyses add another level that allows the effect sizes to be correlated within a cluster. In the present case, level 2 involves the multiple effect sizes for the different age groups in each study, whereas the level 3 “clusters” correspond to each study. Analyses were conducted using the metaSEM package in R (Cheung, 2012), which generalizes the structural equation modeling framework to model the nested dependencies of effect sizes.

In doing our analyses, we initially tested for linear trends. However, the theoretical predictions outlined above focused mostly on a discontinuous “step” function—a switch from effectiveness in early childhood and adolescence and to ineffectiveness later in adolescence—when more adolescents have begun puberty, when concerns about autonomy are increased, and during the transition to high school. We therefore tested for this discontinuity. Finally, we compared this within-study analysis to the more traditional between-study moderation test, to demonstrate the potentially misleading nature of past analytic procedures.

Methods

Data

Inclusion and exclusion criteria. To be included in the present meta-analysis, a study had to meet several criteria. First, all studies needed to have evaluated the effectiveness of an anti-bullying intervention with measured outcomes of bullying others. We used the same definition of a bullying program as Ttofi and Farrington (2011)—a program designed to reduce school bullying, defined as physical, verbal, or psychological attack or intimidation that is intended to cause fear, distress, or harm to the victim and that involves an imbalance of power. Like Ttofi and Farrington (2011), we excluded general aggression-reduction programs. Second, because differential program effects across ages were of primary interest to this meta-analysis, a study had to involve data on multiple age groups to be included.² Third, the study had to provide the statistical information required to derive the effect size either from the report itself or from personal communication with the authors. Lastly, studies had to have appeared in electronic search databases or have been available to us by the end of our search.

Report identification and selection. Multiple strategies were used to locate studies that met the inclusion criteria. A flowchart depicting these is presented in Fig. 3. First, we reviewed previous meta-analyses and narrative reviews in order to re-analyze previous interventions included in older reviews (i.e., Brown, 2009; Farrington & Ttofi, 2011; Merrell et al., 2008; Polanin, Espelage, & Pigott, 2012; Smith et al., 2004; Vreeman & Carroll, 2007). In addition, we searched for any new meta-analyses. We identified a review by Evans et al. (2014), which yielded two additional studies. We extracted all the included studies of the previous meta-analyses, which, based on the title and abstract, seemed to meet our inclusion criteria. This yielded 91 studies.

In order to ensure that we obtained all studies conducted after the previous meta-analyses, we searched for documents catalogued after 2008 (after the most recent of the previous meta-analyses) and before September 2012. The databases searched were PsycINFO, ERIC (Educational Resources Information Clearinghouse), Proquest Dissertations and Theses, Google Scholar, Social Science Citation Index, EBSCO, ASSIA, PubMed, Sociological Abstracts, GALE, Academic Search Complete, MedLine, Campbell Collaboration, and Cochrane Collaboration. For each database, a series of search terms were employed to identify any evaluations of anti-bullying interventions, applying the appropriate

truncation and Boolean techniques to achieve an inclusive yet focused search. The complete search strategy is provided in online supplemental material Appendix B. Our search strategy incorporated all search terms from all previous meta-analyses. This search yielded 14,889 potential studies. Then, a backward search was employed. Furthermore, we emailed experts in the field and asked them for relevant published studies. Upon evaluating titles and abstracts, we identified 96 more potential evaluations.

Full-texts for these studies were judged for relevance, resulting in three sets of studies. The first were excluded studies that did not meet our inclusion criteria upon full-text review ($k = 119$). The second set ($k = 8$) included studies that met all the inclusion criteria including effect size data by age or grade. The third set ($k = 60$) had studies that met all but one inclusion criteria, which was the effect size data by age or grade. The studies in this final set reported a multi-age sample but no effect size data separated by age.

Our next step was to contact all the authors of the identified studies that seemed to meet inclusion criteria but did not report the necessary effect size data. We requested that they calculate the necessary means, standard deviations and sample sizes so we could compute effect size data by age. If first authors did not respond, co-authors were contacted next in sequential order. Out of 60 studies, we received 22 responses from authors. Fifteen of the responding authors provided the necessary data to calculate effect sizes per age group. The other 6 responses either could no longer access the data ($k = 5$) or provided another contact person that later did not respond ($k = 1$).

This left a sample of 23 reports with the necessary statistical information for computing within-study age trends. See Fig. 3 and Table 2. Three of these reports only included data on victimization, and not bullying. One report involved a post-hoc separation of schools into intervention and control groups, after seeing where the intervention did and did not have benefits, so it was excluded. Thus, the final sample for our primary analysis of bullying outcomes was 19 reports with 72 effect sizes (results for victimization outcomes appear in Footnote 5).

Measures

Outcomes. The outcome of interest was reductions in reports of bullying other students. Whenever a composite index was used by the primary study, we coded the results based on the composite score instead of the individual items. For example, a study may report physical bullying and verbal bullying scores as well as a total bullying score; the latter was used when possible. If a composite score was not used and multiple indices of bullying were reported, then when computing our effect sizes we used two-stage meta-analyses that first aggregated effects across all dependent variables to produce a single effect size estimate. This was done using standard formulas for averaging dependent effect sizes in the Comprehensive Meta-Analysis software (Version 2.2; Borenstein, Hedges, Higgins, & Rothstein, 2005; for more background, see Cheung & Chan, 2004; Marín-Martínez & Sánchez-Meca, 1999; Rosenthal & Rubin, 1986).

We used the standardized mean difference to estimate the effect of the anti-bullying intervention. This calculation results in a measure of the difference between the two group means expressed in terms of their common standard deviation. When this information was not reported in a study, corresponding inference test statistics (e.g., t -statistic, F -statistic, p -values) were used to derive an effect size. Effect sizes reported as odds ratio were converted to Cohen's d effect sizes using commonly-employed formulas (Chinn, 2000; Hedges & Olkin, 1985). We used the Comprehensive Meta-Analysis software to calculate effect sizes (Borenstein et al., 2005). Table 2 reports showing trends in effect sizes across grade levels.

Age. Because studies often did not report exact ages of students, we used grade level as a proxy. Some countries (such as Finland) number their grade levels differently from the United States, and so grade levels for these countries were re-coded to correspond to the United States system.

² We also required that a given study had sufficient data at each age group; we selected $n = 10$ as a cutoff.

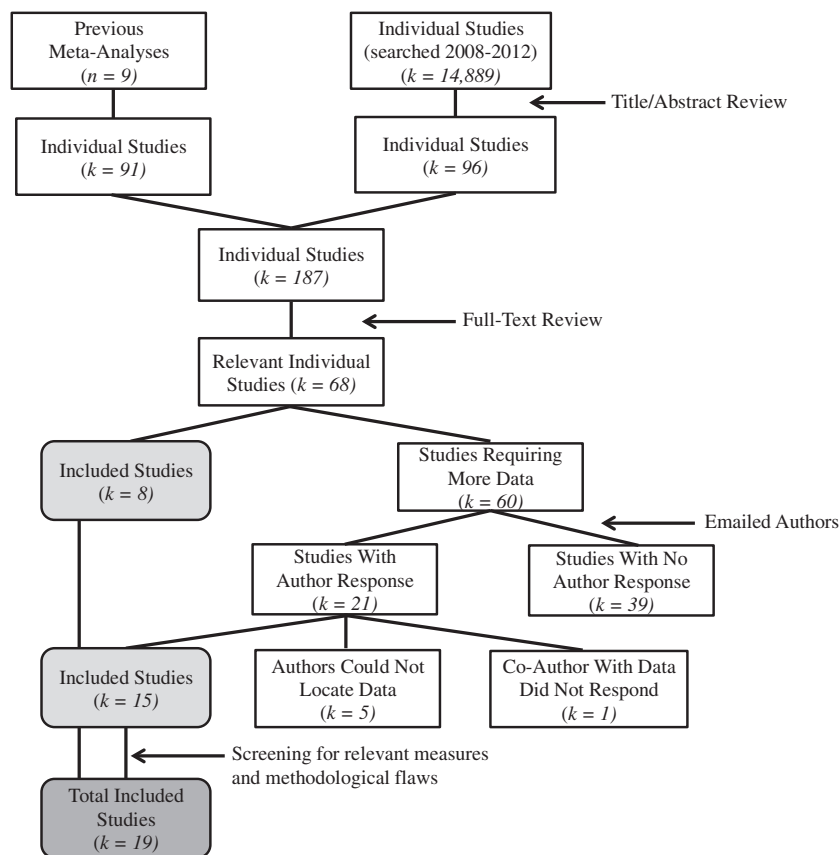


Fig. 3. Flow chart for creation of sample of effect sizes used in meta-analysis of effects on bullying outcomes n = number of meta-analyses k = number of studies.

Results

Do anti-bullying programs decline in efficacy with age?

Preliminary analyses. In the full sample of 72 effect sizes, the simple correlation between age and effect size was $r = -.20$ such that older participants showed weaker effects, as expected by theory. Next, we estimated the within-study correlation between age and effectiveness for each study, calculating an r value for each; the average was $r = -.43$ and the median was $r = -.83$. Furthermore, 74% of studies showed negative correlations, and in a two-tailed sign test this was marginally significantly different from 50%, $p = .063$. This preliminary analysis is consistent with theoretical predictions of a negative relation between age and anti-bullying program effectiveness. However, this analysis does not take into account clustering of the data or potential non-linearity, nor does it involve a formal meta-analytic test of significance that weights for sample size, something we consider next.

Three-level meta-analysis: Linear and non-linear effects. We conducted a three-level random-effects meta-analysis, with level 1 corresponding to participants (whose raw data are not available), level 2 corresponding to effect sizes at different age groups within studies, and level 3 corresponding to studies (Cheung, 2012, in press). Maximum likelihood estimation was used. Throughout, we include dummy variable covariates: design (experimental vs. non-experimental), country (U.S. vs. non-U.S.), and publication type (Journal article vs. not).

When treating age as a continuous linear variable, there was a marginally significant trend such that older age groups showed smaller effects, $b = -.02$, $Z = -1.91$, $p = .056$.

Raw effect sizes, unweighted for sample size, are plotted in the left panel of Fig. 4. The left panel in Fig. 4 suggests a drop in efficacy toward

the end of middle school, consistent with our theory-based predictions of a discontinuity in effect sizes. This suggests that a linear analysis might not be the appropriate comparison. Confirming this, in a three-level meta-analysis, the dichotomous comparison of effect sizes in grades 1–7 vs. grades 8–13 was significant, $b = -.12$, $Z = 2.19$, $p = .028$. Follow-up three-level meta-analytic tests found that in grades 1–7 there was a significant average effect of anti-bullying interventions, $d = .13$, $Z = 4.48$, $p < .001$, whereas in grades 8+ there was no significant average effect, $d = .01$, $Z = .22$, $p = .83$.³

Further inspecting the left panel in Fig. 4, however, seems to reveal that effect sizes continue to decline after 8th grade. We therefore tested a step function by creating two predictors: a variable that increased linearly from 1st grade to 7th grade, and a second variable that increased linearly from 7th grade to 13th grade. When both were entered into the model, there was no significant trend from 1st to 7th grade, $b = .004$, $Z = .21$, $p = .829$, but there was a significant decline from 7th to 12th grade, $b = -.06$, $Z = 2.40$, $p = .016$.⁴ Using this model, values for each grade level were estimated; these are plotted in the right panel in Fig. 4. Remarkably, these estimated values suggest that by roughly 10th grade anti-bullying efforts are in the direction of iatrogenic, harmful effects, on average. Although this iatrogenic effect for high schoolers was not significant on average, it was significant in some individual studies (e.g., Hanewinkel, 2004).⁵

³ We also examined whether the elementary school years (up to grade 5) differed from middle school years that showed treatment effects (grades 6 and 7). They did not.

⁴ Because only one study (conducted in Germany) involved 13th grade, analyses were re-conducted dropping that age group, to ensure this outlier was not driving effects. When this was done, the linear decline in effect sizes from 7th to 12th grade remained significant, $b = -.05$, $Z = 2.09$, $p = .037$.

Table 2
Characteristics of studies meta-analyzed.

First author (year)	Type of document	Research design	Location	Grade	Sample size	Sparkline for within-study age effect*	Available information about intervention
Baldry and Farrington (2004)	Journal article	Experimental, pre-/post-test	Italy	6–8	T: 131 C: 106		Instruction in social cognitive competence skills; kit of 3 videos and a booklet, used in active methods such as role playing, group discussions, and focus groups
Baly and Cornell (2011)	Journal article	Experimental, post-test	U.S.	6–8	T: 650 C: 609		Six-minute video called “Bullying or not” to help students distinguish bullying during peer conflict with three pairs of scenes including verbal, social, and physical bullying. Importance of bullying prevention is encouraged.
Beran, Tutty, and Steinrath (2004)	Journal article	Experimental, pre-/post-test	Canada	3–4	T: 66 C: 63		Program for victim of bullying and for bullying awareness; use of puppet show; 4 footsteps to tackle bullying
Brown, Low, Smith et al. (2011)	Journal article	Experimental, pre-/post-test	U.S.	3–5	T: 1361 C: 1328		Steps to Respect Program; staff training; core instructional session for all school staff and two in-depth training sessions for counselors, administrators, and teachers; classroom curriculum; parent engagement
Cross et al. (2012)	Journal article	Single-group; pre-/post-test	Australia	4 & 6	1,156		Use of “Whole-school planning and strategy manual”; home activities linked to each classroom activities; 16 skills-based newsletter items; classroom curriculum
Ertesvag and Vaaland (2007)	Journal article	Single-group; pre-/post-test	Norway	6–11	745		Series of seminars for teachers and administrators; seminar for school management personnel and school representatives
Flannery et al. (2003)	Journal article	Experimental; pre-/post-test	U.S.	K–5	C: 681 T: 561		Peace Builders; daily rituals and cues to support 5 simple rules of praising people, avoiding put-downs, seeking wise people, noticing and correcting hurts, and righting wrongs; supporting pro-social behavior through positive referrals, prominent signs, adults actively monitoring
Fortson et al. (2013)	Report	Experimental, post-test	U.S.	4–5	T: 48 C: 57		Playworks: The Playworks program places full-time coaches in low-income schools to provide opportunities for organized play during recess and class time. Playworks activities are designed to engage students in physical activity, foster social skills related to cooperation and conflict resolution, improve students’ ability to focus on class work, decrease behavioral problems and improve school climate.
Frey et al. (2005)	Journal article	Experimental; pre-/post-test	U.S.	3–6	T: 264 C: 248		Steps to Respect Program; staff training; core instructional session for all school staff and two in-depth training sessions for counselors, administrators, and teachers; classroom curriculum; parent engagement
Gollwitzer, Eisenbach, Atria, Strohmeier, and Banse (2006)	Journal article	Experimental; pre-/post-test	Germany	6 & 8	T: 89 C: 60		Viennese Social Competence training (instruction in the impulse phase, reflection phase, and action phase)
Hanewinkel (2004)	Book chapter	Single-group; pre-/post-test	Germany	4–13	4,366		Based on the Olweus Bullying Prevention program; playground supervision, staff meetings, teacher–parent meetings, classroom anti-bullying rules; talks with bullies and victims, and serious talks with parents of involve children
Hunt (2007)	Journal article	Experimental; pre-/post-test	Australia	6–8	T: 104 C: 198		Parent and teacher meetings about the nature of bullying in schools; classroom-based discussion of bullying; and activities from anti-bullying work-book
Kärnä et al. (2011)	Journal article	Experimental; pre-/post-test	Finland	5–7	T: 4,201 C: 3,965		KiVa whole-school intervention, meaning that it uses a multilayered approach to address individual-, classroom-, and school-level factors; curriculum involving discussions, group work, and role-playing exercises; short films about bullying; anti-bullying computer game; teacher program manual, recess monitors, and mediation meetings.
Kärnä, Voeten, Little, Alanen, et al. (2011)	Journal article	Cohort-longitudinal	Finland	2–10	T: 141,103 C: 156,634		KiVa whole-school intervention, meaning that it uses a multilayered approach to address individual-, classroom-, and school-level factors; curriculum involving discussions, group work, and role-playing exercises; short films about bullying; anti-bullying computer game; teacher program manual, recess monitors, and mediation meetings.
Kärnä (2012)	Journal article	Experimental; pre-/post-test	Finland	3 & 4, 9 & 10	T: 7,717 C: 6,283		KiVa whole-school intervention, meaning that it uses a multilayered approach to address individual-, classroom-, and school-level factors; curriculum involving discussions, group work, and role-playing exercises; short films about bullying; anti-bullying computer game; teacher program manual, recess monitors, and mediation meetings.
Koivisto (2004)	Book chapter	Single-group; pre-/post-test	Finland	5, 7 & 8	485		Parent–teacher meetings, anti-bullying rules, anti-bullying curriculum material, firm recess monitoring, pupil-welfare group with head teacher, representative from teaching staff, school psychologist, school doctor, and nurse
Menard, Grotzger, Gianola, and O’Neal (2008)	Report	Experimental; pre-/post-test	U.S.	3–8	T: 295 C: 597		Comprehensive school-based intervention; classroom curriculum
Orpinas, Horne, and Staniszewski (2003)	Journal article	Single-group; pre-/post-test	U.S.	K–5	508		Collaborative school-wide program; positive environment, education, and staff training
Salmivalli, Kaukiainen, and Voeten (2005)	Journal article	Single-group; pre-/post-test	Finland	5 & 6	761		Training for teachers; whole-school anti-bullying policy

Note: Only includes studies reporting effects on bullying (excludes studies reporting effects on victimization). * Red dots in sparklines correspond to negative (harmful) effects. Descriptions of interventions adapted from summaries provided by previous meta-analyses such as Tfofi and Farrington (2011) and from our own review of the materials; descriptions vary in detail because the information provided in past reports varied.

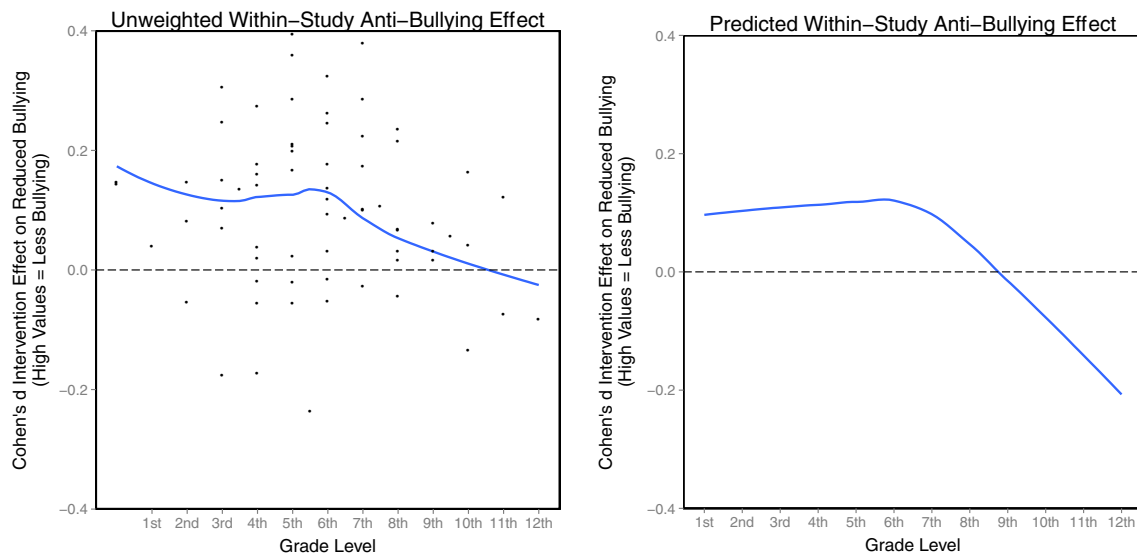


Fig. 4. Anti-bullying efficacy declines with age: Unweighted and model-predicted effects. Loess smoothing curves. In the left panel, each dot corresponds to an effect at a given age within a study; within studies, effects within studies are centered on the grand mean to facilitate comparisons across studies. The left panel is “raw” and does not weight for effect size precision. In the right panel, values are estimates that were predicted from the three-level meta-analysis regression, and it weights observations based on effect size precision.

Comparison to standard between-study techniques

Finally, we sought to replicate past studies' between-study moderation analyses. This analysis averaged the grade levels for each study and the effect size for each study, to produce only one effect size estimate and one age group per study. Conducting this analysis is helpful for the present purposes in confirming that the differences between our results and those from past meta-analyses is due to our use of proper analytic techniques, and not due to the more limited sample of studies that met our inclusion criteria of having multiple effect sizes across ages.

Recall that many past studies found a non-significant age moderation, such that program efficacy was slightly but not significantly lower for older students (Ferguson et al., 2007; Fossum, Handegård, Martinussen, & Mørch, 2008; Merrell et al., 2008; Smith et al., 2004; Vreeman & Carroll, 2007; Wilson & Lipsey, 2007), whereas one study

found a significant *positive* relation (Ttofi & Farrington, 2011). Using data from our set of studies, we replicated the former finding of no significant relation between age of participants and effect size, $r = .05$, *n.s.* Raw data and a best-fit regression line are depicted in Fig. 5. This demonstrates that while traditional meta-analytic techniques might lead to a conclusion that anti-bullying programs are just as effective among older adolescents compared to younger ones, this appears to be an artifact of a misleading statistical analysis.

Discussion

Are anti-bullying programs effective for older adolescents, the age at which many highly visible tragedies involving bullying have occurred? Past theoretical and empirical reviews have suggested they may not be (Berger, 2007; Smith et al., 2012), but past meta-analyses conducting between-study tests of moderation found either no significant differences across age or a significant *positive* relation between age and program efficacy (Ttofi & Farrington, 2011). The present study obtained new calculations of past studies' effect sizes and conducted a novel three-level meta-analysis of within-study age moderation. This analysis showed the theoretically predicted *negative* relation, signifying reduced efficacy for older teens (or, rather, no efficacy for older teens). Using the same dataset, we were able to replicate the null or slightly positive relation shown in past between-study moderation analyses. Thus past findings may have been artifacts of a misleading methodology.

The age trends reported here are corroborated by non-experimental evidence (Finkelhor, Vanderminden, Turner, Shattuck, & Hamby, 2014). A national probability sample survey of thousands of young people in the United States showed that elementary-aged children exposed to high-quality bullying programs reported significantly reduced bullying, as in the present study. However, adolescents in high school showed a non-significant trend in the direction of *increased* bullying when exposed to a high-quality program, a finding that mirrors the present study's results.

This research has a number of implications. The first calls into question the wisdom of state mandates regarding anti-bullying programs for high schools. The null effects alone suggest that it might be a misuse of resources until improved interventions are developed. The possibility of a negative, iatrogenic effect suggests ethical concerns. Of course, ultimately it may be effective to require schools to implement anti-bullying programs. Yet it may be prudent to wait until new

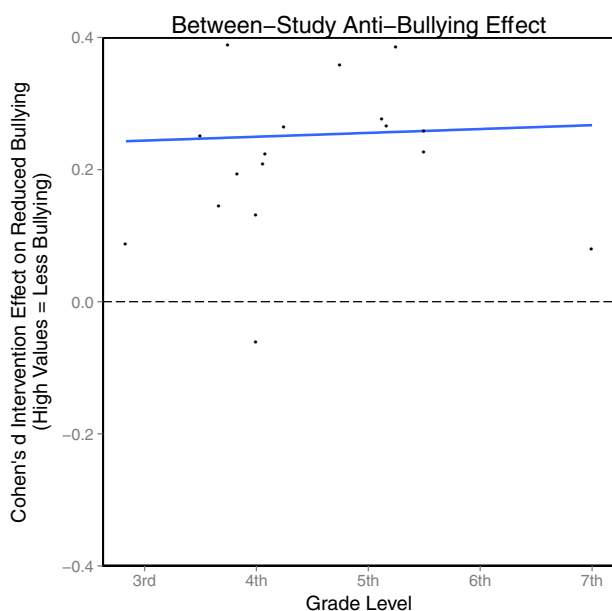


Fig. 5. Between-study analyses moderation by age produces no effect of age on efficacy. Linear regression line.

interventions can be created or adapted and shown to be effective for older adolescents.

The present research also suggests that it is not sufficient to “age up” existing materials that are tested with younger children, for instance by switching out the examples or the graphic art used in the activities. For instance, the highly-successful and rigorously-tested KiVa did not change the basic theoretical target for intervention for older adolescents, but it did make changes to the framing of the content. The online portion of the KiVa curriculum for children features anime-style characters in “KiVa Game” but then changes for older adolescents to something called “KiVa Street,” which features an edgy teen with skateboarder clothes and a stocking cap. Even with tens of thousands of participants, the latter showed no significant benefits for older adolescents (Kärnä, Voeten, Little, Alanen, et al., 2011). This points to the possibility that, in some cases, it may be important to re-think the theoretical target for a given program when aiming it at older adolescents.

Next, this paper reinforces the methodological concern about within versus between-study moderation that has been raised by some meta-analytic experts (e.g., Cooper & Patall, 2009). Between-study analyses, at least in the field of bullying, introduce undesirable confounds in that both the content of the bullying intervention and the age of the participants vary across studies. At best, this introduces measurement error, leading to a need for a very large set of studies in order to detect reliable between-study relations. At worst, this can lead to systematic biases. Building on the logic of ecological fallacies and Simpson's Paradox, between-study meta-analyses aggregate up a level—from age groups to studies—producing one effect size estimate when in fact several were present. Just as comparing average levels of a personality trait across nations often leads to different conclusions about the correlates of that trait than comparing average levels within nations, so too can the relation at the study level misrepresent significant variance within studies (for a discussion of this, see Cooper & Patall, 2009). Concretely, in the present case, the between-study correlation of age with effectiveness was $r = .05$, whereas the median within-study correlation with age was $r = -.83$. In this case, the former masked an important relation.

More generally, the present findings may serve as a cautionary tale about the interface between public policy and developmental science. Existing meta-analytic evidence provided some justification for the push to mandate anti-bullying programs for high school students. However sometimes it may be important to go the extra step—in the present case, obtaining raw data calculations for within-study effect sizes—to truly address the sub-groups of students affected by the policies. It is also important for primary study authors, ourselves included, to report information necessary to calculate effect sizes within important sub-groups whenever possible.

Potential limitations

The present investigation has a number of limitations. First, our effect size dataset is limited by non-response. It is possible that some of the excluded studies might have showed different age-related trends than those included. However, it is important to note that the included studies involved a great deal of data—over 350,000 participants in grades 1–13 from several western nations. In addition, the studies that were not able to provide data were disproportionately those that (a) were not recent, and (b) used non-experimental, non-causal methodology. Our response rate for experimental or quasi-experimental studies with large samples conducted in the past decade years was high. Thus, the present meta-analysis can to some extent be reasonably considered a reflection of the latest and best efforts at bullying prevention.

Second, we do not have direct evidence that the theoretical reasons to expect age-related moderation did, in fact, account for the meta-analytic findings presented here. However some initial evidence is beginning to emerge in support of the possibility that older adolescents react more negatively to anti-bullying lessons within a comprehensive social-emotional-focused middle school

program. For instance, early analyses of new longitudinal data from a school-level randomized experiment originally reported by Espelage et al. (2013) show no declines in teacher-rated engagement with the anti-bullying content for youth in grades 6 to 7, but a sharp and statistically significant decline in student engagement 8th grade, such that 8th graders were much more disengaged from the lessons compared to younger peers.

Next, it is possible for some of the negative effects reported in evaluations of past programs to be due to well-known problems with reference bias in self-reports (Biernat, 2003). That is, it is possible that an intervention that makes adolescents aware that certain behaviors—like exclusion—count as “bullying” may lead them to report that they do it more often (for other research showing that a group's frame of reference may change post-intervention, leading to counter-intuitive directional effects of self-reports, see Dobbie & Fryer, 2009; Tuttle et al., 2013). Investigating this possibility is beyond the scope of the present meta-analysis. However it is important to note that if reference bias was a possibility, then the positive findings too must be suspect. If reference bias was at play, the benefits seen among younger children might have been due to exposure to information about severe bullying, making children lower their estimates of how serious their own bullying behavior was. Unless it could be shown that there are developmental differences in the prevalence or direction of reference bias, the reference bias problem does not plausibly seem to be a cause of the age-related trends documented here.

Finally, while we found that on average anti-bullying interventions had no (or a negative) effect among older adolescents in high school, this does not mean that there are no cases of programs that detected significant differences in this age group. For instance, our meta-analysis only included studies that could provide estimates from multiple age groups, but some studies that were excluded from our search had been conducted only with older adolescents. By inspecting lists of studies included in past meta-analyses (e.g., Ttofi & Farrington, 2011) we found two studies that reported at least one significant beneficial effect in at least one sub-group of high school students (Evers, Prochaska, Van Marter, Johnson, & Prochaska, 2007; Huey & Rank, 1984). Yet many other excluded studies found null effects or harmful effects (Cowie & Olafsson, 2000; Lee, Hallberg, & Hassard, 1997; Merrell, 2004; Peterson & Rigby, 1999; Schumacher, 2007; Tierney & Dowd, 2000). While it may be tempting to look at the former group to learn about effective intervention for older teens, the results of the present meta-analysis and the failures to find beneficial effects in many other cases suggest we cannot rule out the possibility that past significant beneficial effects were due to chance or due to other analytic procedures that might have resulted in false positive findings (Simmons, Nelson, & Simonsohn, 2011). Further, there may have been many other failed anti-bullying intervention studies conducted with high school students that do not exist as research reports, because non-significant findings are less likely to be written up (Franco, Malhotra, & Simonovits, 2014).

Conclusion

Altogether, the present analysis suggests that we cannot yet confidently rely on anti-bullying programs for grades 8 and above. It seems safer to do so with younger children and adolescents in grades 7 or below, but with the caveat that these effects are modest (at least in our statistical models) and likely to vary across context and implementation. Further, other research finds that these modest effects may only be present in European countries and that practitioners should expect null effects even among children in the U.S. (Evans et al., 2014).

Does this mean that schools and researchers should not attempt to change bullying among older adolescents? No. There have been exciting advances in psychological theory that have provided a wide variety of possible targets for intervention in this age group (e.g., Rodkin et al., 2013; Rudolph et al., 2011; Yeager et al., 2013). At the same time, there have been important improvements to behavior-change

techniques—that is, techniques that “nudge” people's behavior or that “redirect” their thinking (Thaler & Sunstein, 2008; Wilson, 2011; also see Yeager & Walton, 2011), but these are under-utilized in existing programs (for a rare study using state-of-the-art behavior change tactics, see Paluck & Shepherd, 2012). One high priority will be to move this basic psychological research more quickly into programs that reduce bullying. A related priority will be to test whether simply changing the delivery mechanisms for existing interventions, making them more developmentally appropriate and psychologically “wise,” might unlock latent effectiveness for existing approaches (Walton, 2014). Despite the difficulties faced by past research, we believe that a worthy investment of research resources is to address the highly important—and, we continue to believe, solvable—problem of reducing bullying among older adolescents.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.appdev.2014.11.005>.

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