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Bryanna Hahn Fox, Department of Criminology, University of South Florida, Tampa, Florida
David P. Farrington, Institute of Criminology, Cambridge University, United Kingdom
Maria M. Ttofi, Institute of Criminology, Cambridge University, United Kingdom

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Bryanna Hahn Fox, Department of Criminology, University of South Florida, Tampa, Florida
David P. Farrington, Institute of Criminology, Cambridge University, United Kingdom
Maria M. Ttofi, Institute of Criminology, Cambridge University, United Kingdom

Bullying prevention programs have been shown to be generally effective in reducing bullying and victimization. However, the effects are relatively small in randomized experiments and greater in quasi-experimental and age-cohort designs. Programs that are more intensive and of longer duration (for both children and teachers) are more effective, as are programs containing more components. Several program components are associated with large effect sizes, including parent training or meetings and teacher training. These results should inform the design and evaluation of anti-bullying programs in the future, and a system of accreditation of effective programs.

Bullying and victimization (being bullied) have been shown to have many serious and long-term effects on the physical and mental health of children (Ttofi and Farrington 2008). Specifically, results from a systematic review of bullying and its effect on later criminal behavior suggest that school bullying perpetration is a significant predictor of offending an average of nearly six years in the future, even after controlling for other major risk factors for criminality (adjusted Odds Ratio [OR] = 1.89; 95% confidence interval (CI) = 1.60–2.23) (Ttofi et al. 2011; Farrington et al. 2012). Being bullied is shown to be a significant predictor of depression an average of seven years later, even after controlling for other major childhood risk factors (Ttofi and Farrington 2011). Even more significant is the relationship between bullying perpetration and the commission of future violence (OR = 2.04; 95% CI= 1.69–2.45), with the effects again persisting many years later (Ttofi et al. 2012). As over half of all children are bullied, and half admit to bullying in school (Farrington 1993), these findings have significant and widespread implications.

Consequently, a great deal of resources have been invested in programs aimed at reducing school bullying and victimization (Ttofi and Farrington 2011), with several evaluations and systematic reviews conducted of the overall effectiveness of the programs (for example, Smith et al. 2004;Vreeman and Carroll 2007; Farrington and Ttofi 2009). However, no firm conclusions have been drawn regarding the specific components of anti-bullying programs that yield the best, and most consistent, results. This paper addresses this issue by focusing on the fundamental components, implementation features, and methodological designs of successful anti-bullying programs, given that these core elements are the foundation upon which the success of any program is based. Drawing on the results of recent meta-analyses examining the effectiveness of anti-bullying programs from around the world (Farrington and Ttofi 2009; Ttofi and Farrington 2011), two aspects of program implementation – duration and intensity – were found to be highly significant in decreasing both bullying and victimization, while parent training and teacher training were among the most effective program components. Overall, anti-bulling programs were effective in reducing bullying by 20 to 23 percent, and victimization by 17 to 20 percent. Through the present research we aim to develop a better understanding of the research design, implementation features, and program components that are most effective in preventing school bullying and victimization, and lay the foundation for more successful future anti-bullying programs.

1. Research Design

Anti-bullying programs utilize four main research design types: 1) randomized experiments; 2) intervention/control comparisons with before-and-after measures of bullying and victimization; 3) other intervention/control comparisons; and 4) age-cohort designs (Ttofi and Farrington 2011). Of these, it has been widely recognized that randomized experiments are the "gold standard" in terms of demonstrating most convincingly whether a specific treatment has an effect on an outcome (Farrington and Welsh 2005). Provided that a sufficiently large number of units are randomly assigned during the experiment, and the participants in the control and treatment conditions are comparable on all measured and unmeasured extraneous variables (within the limits of natural fluctuation), the randomized experiment has the highest potential internal validity of all design types (Weisburd, Lum, and Petrosino 2001; Ttofi and Farrington 2011). While it would be expected that all prevention programs would opt to utilize randomized experiments because of the scientific advantages of this design, several difficulties and threats may prohibit the use of randomized experiments, or prevent the full benefits of the design from being achieved. Most notable of these limitations is the added time, cost, and cooperation necessary to enable a proper randomized experiment to occur. Some institutions refuse to participate in studies requiring so much effort and cooperation (Weisburd, Lum, and Petrosino 2001), and therefore those that do agree to participate may not be a representative sample of the whole population. This may limit the external validity of randomized experiments, while differential attrition from the treatment and control conditions may pose a threat to internal validity (Farrington 2003).

Finally, having an insufficient number of randomized units may threaten the validity of a randomized experiment. Unfortunately this is often the case for bullying prevention programs, which tend to randomize a small number of schools, rather than a large number of children within the schools (Ttofi and Farrington 2011, 30). Table 1 presents a detailed description of the units of randomization used in the bullying prevention programs included in the Campbell Collaboration meta-analyses conducted by Farrington and Ttofi (2009). It can be seen that only Karna et al. (2011) randomized a reasonably large number of schools (78).

Table 1: Units of randomization used in bullying prevention experiments

Children:
De Rosier (2004) => 18 experimental students from each of eleven schools (N = 381)
Beran & Shapiro (2005) => 66 experimental students from two schools (N = 129)
Boulton & Flemington (1996) => 84 experimental students from one school (N = 164)
Meyer & Lesch (2000) => 18 experimental students from three schools (N = 36)
Classes:
Baldry & Farrington (2004) => 10 classes (N = 224)
Schools:
Cross et al. (2004) => 29 schools (N = 1,957)
Fekkes et al. (2006) => 50 schools (N = 2,221)
Fonagy et al. (2009) => 3 schools in experimental 1 condition; 3 schools in experimental 2 condition; 3 control schools (N = 1,345)
Frey et al. (2005) => 6 schools (N = 1126)
Hunt (2007) => 7 schools (N = 400)
Jenson & Dieterich (2007) => 28 schools (N = 668)
Karna et al. (2011) => 78 schools (N =5,641)
Rosenbluth et al. (2004) => 12 schools (N = 1,763)
Sprober et al. (2006) => 3 schools (N = 144)

Note: N represents total sample size (number of students) in experimental and control conditions together.

Quasi-experimental evaluations with before-and-after measures of the outcome variable are widely considered to be the second-best option to randomized experiments, given that they avoid many of the most significant participant cooperation issues encountered by randomized experiments, although here too internal validity is threatened by differential attrition between control and treatment groups. The internal validity of the design is even more threatened when no measure of the outcome is taken prior to the study in both the control and treatment conditions, as is the case in other intervention/control studies. These studies have no way of establishing original comparability between the treatment and control groups, so if one group

is worse than the other to start with, regression to the mean may occur and threaten the internal validity of results.

The final design type, the age-cohort study, occurs when subjects of a given age after the intervention are compared with a different set of subjects of the same age in the same unit of examination (e.g. school) before the intervention. While this design is often considered methodologically inferior to the randomized and quasi-experimental (with before-and-after measures) designs, the age-cohort design has many advantages in eliminating selection, aging, regression, and differential attrition effects, resulting in high external validity (Olweus 2005; Ttofi and Farrington 2011).

In Farrington and Ttofi's meta-analysis of school bullying and victimization programs (2009), the design of each of the forty-four evaluations was evaluated to determine which design type yielded the most significant effect size overall. Table 2 shows that the before-and-after quasi-experimental designs yielded the strongest effects on bullying (weighted mean OR = 1.60, $p < .0001$), while the other intervention/control studies were most successful for victimization (weighted mean OR = 1.43, $p < .006$). Very interestingly, age-cohort designs were found to be the next most effective for effects on both bullying and victimization (bullying weighted mean OR = 1.36, $p < .0001$; victimization weighted mean OR =1.29, $p < .0001$). Randomized experiments yielded the lowest overall effect size of the four design types for victimization (OR =1.17, $p < .050$), and no significant effects for bullying (Ttofi and Farrington 2011).

Table 2: Effect sizes for bullying and victimization programs with different designs

	Bullying			Victimization		
Program design	OR	CI	*p*	OR	CI	*p*
Randomized experiments Weighted mean (n=14)	1.10	0.97 – 1.26	n.s.	1.17	1.00 – 1.37	.050
Before/after intervention/control Weighted mean (n=17)	1.60	1.45 – 1.77	.0001	1.22	1.06 – 1.40	.007
Other intervention/control Weighted mean (n=4)	1.20	1.04 – 1.38	.010	1.43	1.11 – 1.85	.006
Age-cohort designs Weighted mean (n=9)	1.51	1.35 – 1.70	.0001	1.44	1.21 – 1.72	.0001
Total weighted mean (n=44)	1.36	1.26 – 1.47	.0001	1.29	1.18 – 1.42	.0001

Note: OR = odds ratio; CI = confidence interval.

2. Implementation Features

Program implementation features, such as the duration and intensity of the program for children and teachers, are related to a reduction in both bullying and victimization (Farrington and Ttofi 2009); see Table 3. The Farrington and Ttofi meta-analysis (2009) was among the first to successfully isolate program duration from intensity, which is a highly important distinction (Carmody and Baer 2009, 636), with results suggesting that the longer-lasting and more intensive programs are more successful than shorter and less intensive programs, when controlling for other program elements (Ttofi and Farrington 2011).

Table 3: Effect sizes for implementation features and program components

	Cat (N) OR	Cat (N) OR	*p*
Bullying			
Implementation Features			
Intensity for children	19- (19) 1.25	20+ (13) 1.62	.0001
Duration for children	240- (20) 1.17	270+ (20) 1.49	.0001
Intensity for teachers	9- (16) 1.19	10+ (20) 1.52	.0001
Duration for teachers	3- (19) 1.22	4+ (19) 1.50	.0004
Program Components			
Parent training/meetings	No (24) 1.25	Yes (17) 1.57	.0001
Teacher training	No (13) 1.24	Yes (28) 1.46	.006
Total components	10- (23) 1.30	11+ (18) 1.48	.009
Victimization			
Implementation Features			
Intensity for children	19- (18) 1.21	20+ (14) 1.42	.002
Duration for children	240- (20) 1.15	270+ (20) 1.35	.001
Intensity for teachers	9- (15) 1.22	10+ (21) 1.37	.028
Duration for teachers	3- (18) 1.18	4+ (20) 1.41	.0003
Program Components			
Parent training/meetings	No (24) 1.20	Yes (17) 1.41	.0001
Teacher training	No (11) 1.24	Yes (30) 1.33	ns
Total components	10- (22) 1.33	11+ (19) 1.30	ns

Notes: Cat = dichotomized category of variable; OR =weighted mean odds ratio; duration in days; intensity in hours.

While the general consensus in the field of prevention is that longer intervention is better (Gottfredson and Wilson 2003, 29; Durlak 1995; Gottfredson 1997), not all meta-analyses of developmental intervention programs confirm this result. For example, Gottfredson and Wilson's meta-analysis of school-based substance abuse prevention programs (2003), found the length of the intervention (a mixture of program duration and intensity) to have a positive but non-significant relationship with the outcome effect size. Closer analysis suggested that the positive relationship was driven by a single outlier, which was an "unusually intensive program" involving weekly contact between program staff and students over its two-year duration (Gottfredson and Wilson 2003, 33). This finding illustrates the importance of isolating program duration from intensity in any assessment of the impact of implementation features on a program's effectiveness. Gottfredson and Wilson (2003) acknowledge this point too: "It may also be the case that program length is a poor proxy for program intensity. A more sensitive measure of program intensity may have produced different results" (36).

Farrington and Ttofi's meta-analysis (2009) created separate measures for each program's duration and intensity for both children and teachers. Program duration was defined as the length of the intervention from start to finish, while intensity of the program was defined as the amount of contact, in hours, between program staff and children across the duration of the program. Results indicate that the programs with higher intensity for children (20 hours or more of contact) were significantly more effective in reducing both bullying (OR = 1.62, $p < .0001$) and victimization (OR = 1.42, $p < .002$) than the lower-intensity programs (Ttofi and Farrington 2011). Intensity of training for teachers was also found to increase program effectiveness, as the more intensive programs had higher effect sizes for bullying (OR = 1.52, $p < .0001$) and victimization (OR = 1.37, $p < .028$).

Duration was also significantly related to effectiveness, with longer programs for children found to be more successful (bullying OR = 1.49, $p < .001$; victimization OR = 1.35, $p < .001$) as compared to shorter programs (Ttofi and Farrington 2011). The longer-duration teacher training programs were also significantly more effective in reducing both bullying (OR = 1.50, $p < .0004$) and victimization (OR = 1.41, $p < .0003$) than the shorter teacher training programs (Ttofi and Farrington 2011).

These results support the findings of other bullying prevention program evaluations (Olweus 2005; Smith 1997), that programs need to be long-lasting and intensive in order to create and maintain the necessary school ethos to effectively combat bullying (Ttofi and Farrington 2011). Still, it is feared that "longer time commitments may be a barrier to the ability and willingness of individuals to participate" (Carmody and Baer 2009, 627). This is of particular concern for the children at highest risk for bullying perpetration, as bullies tend to have negative attitudes towards school work and teachers, and tend to be unsuccessful in school (Farrington 1993). It is increasingly likely that these children miss long periods of school, and consequently avoid attending or participating in programs that are more intensive or long-lasting.

Similarly, victims may be at risk of not participating in programs of higher intensity and duration, although for different reasons than the perpetrators. Given that victims typically experience a great deal of psychological and/or physical distress resulting from the bullying (Mellor 1991), they often find it difficult to concentrate on their school work, and may be afraid to go to school because of their fear of being victimized (Farrington 1993, 406). In fact, one study found that 15 percent of persistent school absentees reported being bullied as their primary reason for avoiding school, and 19 percent said that it was one of the major reasons for their continued absence (Reid 1989).

While rigorous analyses of forty-four international prevention programs indicate that program intensity and duration are two separate, but highly significant implementation features in reducing bullying and victimization in schools (Farrington and Ttofi 2009), it is important to recognize that even these critical elements have limitations that may inhibit their benefits from being fully reached, and that no program should be based on duration and intensity alone. Therefore, the program components with the most significant effects on both bullying and victimization must be considered as well.

3. Program Components

Ttofi and Farrington (2011) found that several components (notably firm disciplinary methods and improved playground supervision) were associated with large effect sizes, while work with peers was associated with small effect sizes (see also Ttofi and Farrington 2012).

As program design and implementation features alone may not impact those at highest risk of perpetration and victimization, it has been suggested that new anti-bullying initiatives must go beyond the scope of the school and target additional areas such as the family and teachers of the children (Ttofi and Farrington 2011, 46). Several prevention programs already include such components, with parent and teacher training among the most popular means of extending the program elsewhere in schools and families. As bullied children often do not share their victimization experiences with anyone, parents and teachers tend not to know of bad behavior or not to discuss it with the bullies (Fekkes, Pijpers, and Verloove-Vanhorick 2005), educating parents and teachers on what

to look out for, and how to handle bullies and victims, was thought to be a highly beneficial addition to bullying prevention programs to create awareness of the problem and knowledge about how to address it (Ttofi and Farrington 2011).

Relevant research on parent and teacher training suggests that positive outcomes occur when families and educators are included in school prevention programs (Flay 1999). For instance, trained teachers have been found to be more effective and have more favorable student outcomes, more likely to implement and support other components of the prevention program, and more likely to continue to use a program after its implementation than teachers without program training (Mihalic et al. 2004; Taggart et al. 1990; McCormick, Steckler, and McLeroy 1995; Gingiss 1992). This has led some to suggest that teachers are the "primary agents of school-based prevention efforts, and their support, motivation, and 'buy-in' is crucial to implementation success" (Fagan and Mihalic 2003, 238; also Hunter, Elias and Norris 2001).

Parent training programs have also been quite successful in leading to desired outcomes in a variety of prevention programs (Piquero et al 2009), as parent training was followed by significant improvements in children's behaviors for at least two thirds of treated families in several studies (Webster-Stratton, Reid, and Hammond 2004; Brestan and Eyberg 1998; Taylor and Biglan 1998). Together, these findings are strongly related to the fact that parenting behaviors are known to be the most important risk factor for early-onset conduct problems in children (Webster-Stratton, Reid, and Hammond 2004, 105). Consequently, having meetings with parents and training them how to identify and prevent bullying in their children should predictably play a significant role in the success of anti-bullying programs.

Still, several exceptions have been found regarding the effectiveness of both parent and teacher training components of school-based prevention programs, with some studies finding no improvement, or even negative effects, when parent and teacher training is included (Griest and Forehand 1982; Ferber, Keeley, and Shemberg 1974; Taylor and Biglan 1998; Webster-Stratton 1990; Wahler 1980). In one of the first studies to examine the added benefits of combining teacher training with parent training, child training, or both, to treat children with a conduct disorder, conditions including teacher training were found to significantly improve the children's behavior at school. However, similar effects were also found when only child and parent training was utilized, indicating that no teacher intervention was needed for desired effects to occur (Webster-Stratton, Reid, and Hammond 2004, 121). On the other hand, some studies have found that programs utilizing parent training resulted in significant improvements in children's behavior at home, but not in school or with peers (Webster-Stratton and Hammond 1997; Webster-Stratton, Reid, and Hammond 2004). Some families receiving parent training actually reported a significantly higher level of parenting stress and/or negative life events, leading to a negative impact on the child's behavior (Kazdin 1995; Webster-Stratton 1985; Webster-Stratton and Hammond 1990). As many children who are at highest risk of bullying are disproportionately from lower socioeconomic status families with poor parenting techniques (Farrington 1993), or from single-parent families with high stress levels and family burdens (Strain, Young, and Horowitz 1981), those who stand to benefit most from parent training are those least likely to complete it due to life stress, work conflicts, or lack of motivation (Spoth et al. 1996).

In the meta-analysis conducted by Farrington and Ttofi (2009), both parent and teacher training had significant and positive effects on the reduction of bullying (parent training OR = 1.57, $p < .0001$; teacher training OR = 1.46, $p < .006$) compared to programs without these components (see Table 3). Parent training was also significantly related to reducing victimization (OR = 1.41, $p < .0001$) compared to programs without parent training, but teacher training was not found to have a significant effect on victimization (Ttofi and Farrington 2011) (see Table 3). Together, these findings indicate that parent training and teacher training are individually highly beneficial components of anti-bullying programs, though it is not possible to determine their combined, additive impact on bullying and victimization prevention in the original Farrington and Ttofi study (2009).

In addition to evaluating the effect of parent and teacher training on the success of anti-bullying programs, the impact of the total number of program components is also evaluated in order to account for the fact that when several different program components are included, there is a higher likelihood of influencing every child, family, and school. Similar results were found in a developmental intervention program evaluation, where the total number of program components successfully and significantly predicted future criminal convictions for the program attendees (Koegl et al. 2009, 429). This finding indicates that prevention programs comprised of more components will be more effective than programs with fewer components overall.

Supporting this prediction, a strong and significant effect size on bullying was found for programs containing eleven or more components (OR = 1.48, $p < .009$), though there was not a significant effect size for programs containing a high number of total components on victimization. Combined with the non-significant effect of teacher training in reducing victimization, it seems that the effects of prevention program components on victimization are weaker than the effects of similar components on bullying. It is possible that the programs have more effect on bullies than on victims because their main aim is to prevent bullying from occurring. Still, additional research could be conducted to investigate this issue further.

4. Conclusion

Taken together, these findings indicate that anti-bullying programs work, as the combined effect of the various program designs, implementations, and components is shown to decrease bullying and victimization by an average of 17 to 23 percent (Ttofi and Farrington 2011). This figure encompasses the full span of anti-bullying programs, including, for instance, programs of shorter duration, with lower intensity, without parent training, and with a small total number of components. Therefore it is possible that by refining future programs to comprise only elements, implementation features, and designs known to be most effective, the overall effectiveness of anti-bullying programs would be ever greater.

Still, certain program features turned out to be less successful than expected, including the use of randomized experiments, teacher training (effect on victimization), and total number of program components (effect on victimization). With respect to the randomized experiments, it is not contested that they are the most methodologically superior design in principle, but the manner in which they were utilized in the analyzed programs may have contributed to the lower than expected effectiveness. Specifically, few randomized experiments contained a sufficient number of randomized units (as schools or school classes were the most common units of randomization), leading to a decrease in internal validity and ultimately less significant results. Differential attrition also played a role in decreasing the effects in the randomized experiments, with one of the programs in the analysis suffering twice the attrition rate for the control condition, as compared to the experimental condition (Ttofi and Farrington 2011, 44). It is not surprising that intervention schools are more motivated than control schools to continue participation. If methodological issues such as these were overcome in future studies, it is possible that randomized experiments would yield better outcomes, though establishing this would require additional evaluations and meta-analyses.

The implementation of the programs is very important, with greater duration and intensity for children and teachers yielding better results for both bullying and victimization. Similarly, including parent and teacher training as program components was found to be highly effective for bullying, while parent training (but not teacher training) was found to be a significant predictor of effectiveness for victimization. The total number of program components is also shown to be important to a program's ability to reduce school bullying, while this effect did not apply to victimization.

It is possible to refine this analysis further, by including or prioritizing the program components that have been the most successful overall, and excluding those which are not significant, or perhaps detrimental. For instance, effective components such as improved playground supervision, firm disciplinary measures, good classroom management and clear rules, school conferences, information for par-

ents, cooperative group work, and a school-wide anti-bullying policy, as well as parent and teacher training, would be included in such a program. However, work with peers (peer mediation, peer mentoring, engagement of bystanders in bullying situations), which is actually found to have negative effects on bullying and victimization (Ttofi and Farrington 2011), would not be included in such a program, as peer-based components may "reinforce the aggressive behavior of school bullies and promote a cycle of violence" (Ttofi and Farrington 2012, line 209–210).

It should be noted that the figures quoted in this research show only correlations between program elements and effect sizes, and additional research is required to identify causal effects by randomly allocating elements to programs. This would allow researchers to compare children receiving a certain program with equivalent children receiving the same program but without component X. Using this method, it would be possible to obtain more accurate determinations of the most successful components and programs.

Through this study, and the future research recommended throughout this paper, we may move one step closer to developing a system of accreditation of anti-bullying programs, where only the most effective evidence-based programs are funded and utilized (McGuire 2001). This would ensure that programs or components that have undesirable effects or no effects on bullying and victimization would not be utilized, as it would encourage program funders and potential participants to avoid them. An accreditation system would not only increase our knowledge base concerning the success of bullying and victimization prevention programs, but would also enhance the ultimate goal of our efforts by reducing victimization and bullying in schools.

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Bryanna Hahn
bh349@cam.ac.uk

David P. Farrington
dpf1@cam.ac.uk

Maria M. Ttofi
mt394@cam.ac.uk