

Decreasing Delinquency, Criminal Behavior, and Recidivism by Intervening on Psychological
Factors other than Cognitive Ability: A Review of the Intervention Literature

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Research on the causes of crime and delinquency has a long history, with philosophical and theoretical commentary on the topic dating back centuries (see for a review, Binder, 1987; Emler & Reicher, 1995). This work often has been directly or indirectly catalyzed by efforts to define laws and penalties appropriate to juvenile offenders. If one deems a youth to be a cognitively mature decision-maker, then the youth might be more “deserving” of penalties similar to adult offenders. If one instead is sympathetic to the turmoil and tumult inherent in the adolescent experience (see e.g., Blos, 1962; Erikson, 1950, 1968), more lenient penalties may be in order. Given the legal implications, it is unsurprising that most efforts to decrease delinquency often focus on addressing its cognitive ability catalysts. Another benefit to a cognitive ability approach is that it seems to explain the decrease in illegal activity with age. Adults are assumed to have better cognitive capabilities than adolescents, and thus are able to make better decisions.

Three issues confront researchers who focus solely on cognitive ability antecedents to delinquency and criminality. First, focusing on cognitive ability assumes that adults make better (i.e., more conservative) judgments about the consequences of their risky decisions. However, some research suggests that adults may actually feel *more* “invulnerable” to risks than adolescents (e.g., Millstein & Halpern-Felsher, 2002a, 2002b; Quadrel, Fischhoff, & Davis, 1993). Indeed, adolescents have reported greater personal risks for negative events (e.g., injury, having an accident while driving drunk) than young adults (Millstein & Halpern-Felsher, 2002a, 2002b). This work suggests that adolescents are not relatively more optimistic in their risk assessments. Such evidence sheds doubt on the idea that faulty decision-making skills are solely to blame for adolescents’ increased risk-taking tendencies.

Second, recent work has demonstrated the ability of skills other than cognitive ability to predict a number of developmental outcomes in both the economic (e.g., Borghans, Duckworth,

Heckman, & ter Weel, 2008; Cunha & Heckman, 2009; Heckman, 2009; Heckman, Stixrud, & Urzua, 2006) and psychological literatures (e.g., Benet & Ozer-Martinez, 2006; Lodi-Smith & Roberts, 2007; Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007). For example, personality traits appear to predict significant life outcomes (e.g., divorce, occupational attainment, and mortality) as well as socioeconomic status or cognitive ability (Roberts et al., 2007). Moreover, there is evidence that emotional and behavioral skills motivate cognitive skill development, but the reverse does not appear to hold (Cunha & Heckman, 2008). Therefore, not only do psychological factors other than cognitive ability predict developmental outcomes, but they also may indirectly influence outcomes through promoting cognitive development.

Third, research has consistently demonstrated that psychological factors other than cognitive ability predict one's likelihood for delinquent action (for a review, see e.g., Dodge, Coie, & Lynam, 2006; Hirschi, 1969). For example, in a sample of 6th – 10th graders, personality traits significantly predict a number of antisocial behaviors, including conduct problems, aggression, and symptoms of antisocial personality disorder (Miller, Lynam, & Leukefeld, 2003). In that study, facets of conscientiousness, neuroticism, and particularly agreeableness were strongly related to these antisocial outcomes. Similarly, evidence suggests that delinquents' personality traits predicted their likelihood to recidivate (Steiner, Cauffman, & Duxbury, 1999).

When one examines the effect sizes associated with various risk factors for crime it is hard to understand why research has focused so strongly on cognitive ability. Table 1 provides representative effect sizes from several reviews and meta-analyses examining the relative importance of different risk factors (Cottle, Lee, & Heilbrun, 2001; Gerard & Buehler, 2004; Loeber et al., 2007). Upon quick review, it is surprising that interventions have focused on cognitive and environmental factors. Although statistically significant predictors, their effect

sizes are relatively modest in nature. In contrast, factors such as “nonsevere pathology” (e.g., stress and anxiety; Cottle et al., 2001), hostility (Loeber et al., 2005), and impulsiveness (Farrington, Ttofi, & Coid, 2009) are as important if not more important than cognitive ability. For example, compare Table 1 to the magnitude of the correlations found by Miller et al. (2003) between personality facets and the stability of conduct problems: neuroticism (-.02 to .30), agreeableness (-.06 to -.47), and conscientiousness (-.15 to -.35). Indeed, these correlations often are stronger in magnitude than several of the risk factors assumed to be most important for predicting delinquency. Overall, it is clear that intervention research must move past the sole focus on cognitive factors.

The existence of these factors other than cognitive abilities that predict criminality and delinquency invites questions about the ability to intervene and change these characteristics. The potential for intervening to change the personalities of children and adolescents rather than intervening to change abilities was made clear recently by work with the Perry Preschool Project (Heckman, Malofeeva, Pinto, & Savelyev, 2008; Heckman, Moon, Pinto, Savelyev, & Yavitz, 2008; Heckman, Moon, Pinto, & Yavitz, 2008). The Perry Preschool Project is a well-known intervention program, which was intended to promote academic skill development among at-risk youth. The effect of the intervention in the Perry Preschool Project on cognitive skills were relatively disappointing, with no evidence for long-term differential gains in academic or cognitive skills. However, recent analyses have demonstrated that intervention participants outperformed non-participants on a number of important life outcomes, such as employment and criminal behavior. Heckman and colleagues found that cognitive ability factors contribute relatively little to these outcomes, and instead that the Perry Preschool Program seemed to benefit its participants primarily through its effect on personality factors. This work provides a

clear example of the importance of personality variables, given that the program would largely be viewed as unsuccessful if one looked only at cognitive ability outcomes. It also highlights the fact that psychological factors other than cognitive ability, such as personality, are a potential fruitful focus for intervention research. These attributes appear to be changeable, especially in childhood and adolescence, and the changes gained through intervention lead to concrete gains in human capital above and beyond cognitive ability and socioeconomic status.

We therefore suggest that interventions that focus solely on cognitive skills, though often beneficial, may fail to address the totality of the effective ways to intervene to diminish the likelihood of criminal behavior. In the following review, we provide an overview of interventions that focus on changing psychological factors other than cognitive ability that result in diminished criminal and delinquent activity.

Outline for the Review

Two issues often can bias reports of intervention results. First, most evaluations of intervention efficacy are performed by the developers of the intervention program. Accordingly, such results can be colored by the researchers' desire to find positive results of their hard work. Second, given the costs involved in testing interventions, researchers often employ smaller samples for evaluation tests, leading to questions regarding their generalizability or lack of power. Due to these issues, we focus on reviewing only those studies that have garnered "strong" empirical support. We followed two criteria for defining strong support: (1) that any positive results for a program (or program category) have been replicated at least once, (2) that support for a program has come from multiple research groups.

To help address these issues, we let past meta-analyses of the literature guide our review. It is worth noting that these guidelines often paint a different picture than that portrayed in the

literature. One prominent example is the frequent assumption in the literature that longer interventions should have more significant effects (Dodge, 2008; Kazdin, 1987). However, meta-analyses of intervention efficacy have been more equivocal on this topic; some fail to demonstrate a significant effect for study duration (e.g., Garrard & Lipsey, 2007; Wilson & Lipsey, 2007), while others do find a “dosage” effect (Lipsey & Wilson, 1998). Given this discrepancy, and the emphasis that has been placed on study duration in the literature, we first classified interventions according to whether they were short-term or long-term in nature. In one meta-analysis of interventions across multiple domains, the median study duration was 21-30 weeks (Lipsey & Wilson, 1998). Accordingly, we considered interventions with an average duration of up to 6 months (about 26 weeks) to be short-term, and any intervention that exceeds this threshold to be long-term.

Such an approach also has inherent value for economic analyses of these interventions. Long-term interventions have greater costs than short-term ones, and therefore, need to demonstrate larger effects in order to be cost-effective. To this end, we characterize the reviewed literature according to its duration, and whether it has demonstrated consistent support. In Table 2, we provide an organizing framework for our review, showing how we classified the different intervention programs according to these two factors. It is worth noting that most interventions were short-term in nature, as one would expect given the costs of long-term approaches. More often than not, it appears that efficacy is not contingent upon duration. Indeed, several short-term interventions have demonstrated consistently positive effects.

Within these four cells, we also limited our review to interventions that attempted to intervene on psychological risk factors other than cognitive ability and environmental factors, such as neighborhood or poverty. In this effort, we tried to be as inclusive as possible, and it

became clear that many of the interventions focus on proximal mechanisms that researchers presume they can change. So, for example, researchers focus on improving “social skills” and “aggressive cognitions”, not on “aggression” per se. While this seems a reasonable approach, it creates an interesting mismatch between the risk factors to crime and delinquency and the focus of psychologically oriented interventions. Most of the risk factors appear to be relatively stable personality factors that are akin to cognitive ability. That is, they are difficult to change. Yet, the interventions focus on components of those personality domains that are presumed to be more changeable. It is unclear whether the target of many of the interventions results in change on the psychological risk factors most consistently linked to criminal outcomes. We will return to these ideas in our summary.

Short-Term Positive Interventions

Short-term promising interventions can be generally classified into four sections. First, a number of programs have addressed antisocial behavior from the classroom, likely because schools provide researchers with easy opportunities to sample several youth in one setting. Second, programs have addressed the social skills of youth, given the strong influence that peers have on youth delinquency. Third, intervening in the family system often demonstrates positive outcomes. Fourth, recently, some more provocative studies have demonstrated that changes in nutrition might have an impact on aggression and delinquency.

School-Based Programs

Given that school-based programs are among the more frequently employed, this area has received more attention in literature reviews and meta-analyses (e.g., Garrard & Lipsey, 2007; Gottfredson, Gerstenblith, Soulé, Wormer, & Lu, 2004; Wilson & Lipsey, 2007). We therefore focus on the overarching themes presented by these reviews. Before discussing specific study

characteristics, a clear emphasis espoused by this literature is the need for rigorous implementation. For example, in one meta-analysis, the average effect size for well-implemented school-based conflict resolution programs was .42, compared to .04 - .08 for programs that experienced some implementation problems (Garrard & Lipsey, 2007). Indeed, more than any other variable, it has been suggested that the best predictor of efficacy in school interventions is the school's ability to carry out the intervention (Wilson & Lipsey, 2007).

When evaluating more specific characteristics, one of particular interest is the student's age. For interventions within the family system, it has been frequently suggested that early interventions are preferable (e.g., Cummings, Davies, & Campbell, 2000; Greenberg, Domitrovich, & Bumbarger, 2001), because it is best to address parenting or family issues before they have become too ingrained. Evaluations of school-based interventions though have provided more equivocal results. When examining the effects of conflict resolution education on antisocial behavior, older children have been shown to benefit *more* than younger children (Garrard & Lipsey, 2007). However, the results are more nuanced when considering interventions for aggressive behavior (Wilson & Lipsey, 2007). If these programs are implemented universally (to classrooms as a whole), they tend to work better with younger students. Programs that target at-risk or problem youth though show no systematic age differences. While such results are clearly mixed, we point them out to counter the frequently held belief that interventions *must* start in childhood to prove effective. On the contrary, some interventions appear to work better for adolescents.

This claim also receives support from the literature on after-school programs. One review of the literature suggests that participation in these programs was effective in reducing delinquency among older (grades 6-8) students but not for younger (grades 4-5) students

(Gottfredson et al., 2004). The reviewed programs all included academic and social skills development, as well as recreational services. When looking at the mediators of these effects among older students, the results presented two possibilities. First, after-school program participation was positively related to intentions to *not* use drugs. Second, there is some evidence that these programs also promote positive peer associations. Moreover, the intervention effect sizes were greatest for those programs that emphasized social skills and character development. These results suggest that after-school programs might be effective not because they emphasize academic skills or participation in constructive activities, but rather because they decrease youths' intentions to use drugs and promote their social competence.

Promoting positive peer relations is an important theme for conflict resolution programs in the school as well. Interventions that include peer mediation appear to demonstrate stronger effect sizes, although such programs are few in number (Garrard & Lipsey, 2007). Broadly speaking, conflict resolution programs are generally quite effective in reducing antisocial behavior among youth. However, this is somewhat unsurprising given that programs that target interpersonal skills and behavioral skills have demonstrated some promise in reducing problem behavior, both in and outside of the school environment.

Social Skills Training

A wealth of research has demonstrated the effects of peer influence on delinquency and risky decision-making (e.g., Dishion, 2000; Elliott & Menard, 1996; Gifford-Smith, Dodge, Dishion, & McCord, 2005; Thornberry & Krohn, 1997). Indeed, Thornberry and Krohn (1997) suggest that the negative effects of associating with deviant peers are among the most replicated in the field. As noted above, documented increases in delinquency following ineffective interventions might result from the fact that these programs congregate deviant adolescents

together. It thus is not surprising that Lipsey and Wilson (1998) suggest that treatments that emphasized interpersonal skills are among the most effective both for institutionalized and non-institutionalized juvenile offenders.

Social skills training (SST) was initially employed for use with psychiatric patients (e.g., Argyle, 1969), but was adapted for work with delinquents soon thereafter. Some of the initial work on SST found that it had positive effects on basic social interaction skills (Spence & Marzillier, 1979), but that its long-term effects on social problems were more mixed (Spence & Marzillier, 1981). One SST program that has demonstrated efficacy is Aggression Replacement Training (ART; Glick & Goldstein, 1987). Over a 10-week period, intervention participants were taught moral education, anger control skills, and other social skills (e.g., basic social interaction abilities, stress-coping skills, planning skills, and dealing with feelings). Compared to controls at post-test, intervention participants had fewer behavioral incidents and scored lower on impulsiveness. They also scored better on a number of social skills, including expressing complaints, keeping out of fights, and responding to anger; moreover, there was evidence that intervention participants were also able to transfer these skills to different contexts. A second study with youth who committed serious crimes replicated some but not all of these results. Another social skills program, ASSET, has similarly reported decreases in recidivism among the intervention group, and retention of social skills at 8-month follow-up (Hazel, Schumaker, Sherman, & Sheldon-Wildgren, 1981, 1982).

However, the equivocal nature of results on social skills interventions is worth noting. For example, Bailey and Ballard (2006) found few differences between intervention and control groups across a variety of outcomes. In their discussion, they note that the 10-week program might not be long enough to allow for real, consequential skill development. Another possibility

is that social skills programs might work best if included as part of a broad approach. For example, Serna, Schumacher, Hazel, and Sheldon (1986) found promising results for a program that taught social skills to both adjudicated youth and their parents.

These results point to two important conclusions. First, while the broad category of “social skills training” has received empirical support from multiple labs, as well as support from meta-analyses, the results of individual social skills programs have been more mixed. Second, it seems that social skills programs might work best when implemented in tandem with other types of interventions. As noted above, school programs with social skills training were among the more efficacious. Moreover, social skills might be taught best within the family, as with most things, social interactions are first taught in the home.

Family Interventions

One common thread in the developmental research on delinquency is the importance placed on the family environment. Several family indicators have been invoked as possible risk factors for delinquency and conduct disorder, such as being raised by a single parent, marital troubles between parents, and parental drug use and depression (e.g., Brandt, 2006; Hirschi, 1969; Loeber, 1990; Loeber & Farrington, 2000). The family system often serves as a primary predictor of a wealth of developmental and behavioral problems, and is integrally tied to the other subsystems discussed here (for a review, see Cummings, Davies, & Campbell, 2000). Accordingly, it appears as though family therapy works best when part of a multifaceted approach (Lipsey, 1999), which we discuss with respect to broad interventions. However, a few more narrow family counseling programs have demonstrated promise.

One example is parent management training (PMT), which focuses on teaching parents better disciplinary techniques (Kazdin, 2005). Typically, such programs ask parents to meet with

therapists, and they work together to decide on appropriate punishment programs for their children, and on how to be more responsive to the child's needs. These techniques have received widespread empirical regard (e.g., Eyberg, Nelson, & Boggs, 2008; Kazdin, 2005; Nixon, 2002), and work well with children who have conduct or externalizing problems (Brestan & Eyberg, 1998; Hautmann, Stein, Hanisch, Eichelberger, Plück, Walter, & Döpfner, 2009). Unlike the research on school-based interventions, parental training programs tend to be most efficacious when implemented with parents who have younger children, as it is best to address parenting issues earlier rather than later.

One program though that has shown consistent efficacy with adolescents is functional family therapy (FFT; Alexander & Parsons, 1982; Sexton & Alexander, 2002). FFT works with the family unit as a whole to promote more positive family interactions and problem-solving. Desired outcomes include more empathetic responding to family members, better discussions of family issues, and general family cohesion. On average, families take part in 12 sessions over the course of 3 months, mostly occurring within the home. Results have consistently supported FFT as a means for decreasing problem behavior and recidivism (e.g., Alexander & Parsons, 1973; Gordon, Arbuthnot, Gustafson, & McGreen, 1988). For example, when looking at misdemeanors and felonies, Gordon, Graves, and Arbuthnot (1995) reported a 8.7% recidivism rate for FFT delinquents compared to 40.9% for the comparison youth at 32-month follow-up. These studies provide support that FFT is among the best performing short-term programs with respect to its long-term effects on recidivism.

Two additional programs are worth noting that tend to be more comprehensive in nature. Given the intensive nature of these two interventions, researchers have been more interested in their cost-benefit analysis compared to the interventions above. We note these analyses below,

but generally speaking, they do appear to be relatively cost-effective. Accordingly, we count them among the interventions that have “worked.”

Multisystemic Therapy.

MST was initially developed by Henggeler and colleagues (Henggeler & Borduin, 1990; Henggeler, Shoenwald, Borduin, Rowlands, & Cunningham, 1998) in an effort to treat severely antisocial children and adolescents (typically around 14-16 years old). It is assumed that those youth who enter into MST have multiple issues across multiple domains, which necessitates intensive therapy. Each program is individually tailored to the adolescent, and typically starts with daily sessions that become less frequent over the three- to five-month course of treatment (Burns, Schoenwald, Burchard, Faw, & Sanots, 2000). Due to this flexibility, this program avoids the issues mentioned above with respect to job and vocational training, namely that programs drafted for the population writ large may fail to address the individual needs of the specific juvenile delinquent.

MST was based conceptualized according to the ideals of Bronfenbrenner’s (1979) ecological systems theory. Bronfenbrenner strongly emphasized that a child’s development cannot be accurately viewed by examining it within a single domain. Instead, development occurs within several subsystems and the more proximal systems (e.g., family, school, friends) are all interconnected, which also follows from systems theory (Plas, 1992). Moreover, these proximal systems are subsumed within the broader context of the child’s environment (culture, government, economy). Accordingly, MST treats the delinquent by considering his or her problem within the broader context of these interrelated and hierarchical systems, rather than focusing more narrowly on a single domain. Indeed, Bronfenbrenner’s theory can be viewed as the general rationale behind why broad interventions are generally preferable to narrow ones.

MST programs have received widespread empirical support for their efficacy in reducing behavioral problems. Studies suggest that MST generally leads to fewer re-arrests, less drug use, and decreased incarceration and drug use in comparison to usual juvenile justice services (Henggeler, Borduin, Melton, Mann, Smith, Hall, Cone, & Fucci, 1991; Henggeler, Melton, & Smith, 1992). Among first time offenders, it leads to decreased delinquency and re-offending, and to increased school and family functioning (Sutphen, Thyer, & Kurtz, 1995). Moreover, MST effects have been demonstrated more than two years after intervention (Henggeler, Melton, Smith, Schoenwald, & Hanley, 1993), and one study reports that MST decreased recidivism by 50% in comparison to individual therapy at follow-up over a decade post-intervention (Schaeffer & Borduin, 2005).

Given the consistent evidence for its efficacy, research has investigated the possible costs involved in widespread implementation of MST. The typical cost per child ranges from \$4000 to \$12,000 per child (Brown et al., 1997; Schaeffer & Borduin, 2005; Sheidow et al., 2004). While these costs are prohibitive enough to discourage large-sample evaluations of MST, this is relatively cheap in comparison to traditional juvenile justice services (i.e., incarceration). Indeed, MST was the most cost-effective intervention for juvenile offenders among the 11 programs reviewed by the State of Washington (Washington State Institute for Public Policy, 1998).

Multidimensional Treatment Foster Care

MST programs sometimes are implemented as a last resort before having to displace the juvenile offender. However, when the adolescent needs to be removed from his or her home, one of the most effective options is to place them in multidimensional treatment foster care (Chamberlain & Reed, 1998; Fisher & Chamberlain, 2000). As part of this program, children are taken from their homes and placed in foster care until they reach a set of behavioral benchmarks.

After return to their natural family, counseling is provided on a need basis in the following months. Given the intensive nature of this program, some youth can stay in the program for nearly two years. However, Leve and Chamberlain (2005) reported that the average intervention dosage was around six to seven months in their study.

When in foster care, intervention participants are cared for by several personnel both in and out of the foster home. The first line of treatment comes from the foster parents, who provide consistent positive reinforcement when encouraging social, prosocial, and personal skill development. In addition, youth are provided with opportunities for counseling, and a behavior support specialist to help modify their social interaction skills. While the youth is presented with these opportunities in foster care, the child's natural family also receives therapy sessions to indoctrinate a more positive family environment. A case manager or team supervisor oversees all of these activities, which is particularly important given the number of people involved in this type of intervention.

MTFC interventions have consistently demonstrated promise for reducing delinquency and recidivism. Boys in the intervention committed fewer delinquent actions after one year, and fewer serious offenses at the two-year follow-up than non-treated youth (Chamberlain & Reid, 1998; Eddy, Whaley, & Chamberlain, 2004), and similar trends have been reported with girls as well (Chamberlain, Leve, & DeGarmo, 2007; Leve & Chamberlain, 2004; Leve, Chamberlain, & Reid, 2005). Mediators of these effects include supervision efficacy, disciplinary practices, and decreased exposure to deviant peers (Eddy & Chamberlain, 2000; Leve & Chamberlain, 2005). Such results again speak to the importance of consistent intervention implementation, and the negative effects of deviant peer association.

While MTFC interventions are quite intensive in nature, studies do suggest that they are generally cost-effective. When considering the costs of prevented crimes and incarcerations, Aos, Phipps, Barnoski, and Leib (1999, 2001) report that MTFC saves taxpayers from \$21,836 to \$87,622 per youth (reported in Chamberlain et al., 2007). As another mark of its effectiveness, researchers have begun to modify MTFC programs to instruct regular foster care parents as well (Price, Chamberlain, Landsverk, & Reid, 2009). Preliminary results suggest that MTFC might be effective not only for reducing problem behavior among youth needing intervention, but also for use with “normal” foster-care children.

Health-Based Interventions

Among the more provocative efforts toward reducing crime have been those that target the participants’ nutrition. For centuries, it was assumed that psychological issues resulted from physical or nutritional problems. With the advent of more modern psychological theories, researchers have moved toward new methods for treating mental and behavioral problems. However, in doing so, researchers may have overly discounted the role of physical health on mental health. Indeed, evidence continues to accumulate in favor of the idea that diet can have a profound influence on mood (Kaplan, Crawford, Field, & Simpson, 2007), as well as on antisocial and criminal behavior (Benton, 2007).

For example, one line of work has demonstrated that providing participants with essential fatty acids (EFA), often found in fish oil can decrease levels of aggression (e.g., Gesch, Hammond, Hampson, Eves, & Crowder, 2002; Hamazaki & Hamazaki, 2008; Itomura et al., 2005; Buydens-Branchev, Branchev, & Hibbeln, 2008). In an initial study, young adult prisoners who were given vitamin supplements (which included, along other things, essential fatty acids) demonstrated significant decreases in violent prison offenses compared to a placebo group

(Gesch et al., 2002). Fatty acid supplements have also been shown to decrease both aggression in young girls (Itomura et al., 2005), as well as anger and anxiety in substance users (Buydens-Branchley et al., 2008). One reason why these effects may occur is because these supplements help participants' serotonergic functioning (Hamazaki & Hamazaki, 2008). Serotonin deficiency is related to increased impulsive behavior (Mann, 1992), and such deficiencies have been linked to decreased intake of fatty acids. Therefore, providing individuals with needed fatty acids might help those with under-developed serotonergic systems, who otherwise would be predisposed to aggressive behavior.

Similarly, work has suggested that correcting chemical imbalances and vitamin deficiencies can reduce antisocial behavior. In a study of patients diagnosed with a behavioral disorder, researchers found that a majority had clear chemical imbalances (Walsh, Glab, & Haakenson, 2004). The researchers then provided participants with supplements designed specifically for each individual. Participants showed significant decreases in assaultive and destructive behaviors after 4-8 months of treatment. It is worth noting that, given the idiographic nature of the intervention, the authors did not employ a placebo group. However, these results are promising for future efforts to decrease behavioral disorders through biochemical interventions.

Before concluding this section, it is interesting to note how these studies might relate to cognitive interventions. One longitudinal study found that malnutrition at age 3 predicted behavioral problems at ages 8, 11, and 17 (Liu, Raine, Venables, & Mednick, 2004). This link was mediated at ages 8 and 11 by participants' cognitive ability, but this was not true for the results at age 17. Clearly these results point to the long-term importance of nutrition on externalizing behavior. Moreover, they suggest that it might prove as efficacious to provide early

interventions for nutrition, as it is to provide early cognitive interventions. If nutrition influences cognitive ability, which in turn decreases problem behaviors, it seems that one can better address the problem by intervening at the “root.” This speculation is supported further by the fact that the mediational tests were not significant at age 17, suggesting that the long-term effects of malnutrition on externalizing cannot be fully explained by cognitive ability.

Summary

In summary, four areas provide promise for addressing issues of antisocial behavior using relatively short-term interventions: school, social skills, family, and nutrition. Of the four, the area most in need of future work appears to be social skills interventions; the category as a whole appears effective, but there is greater uncertainty at the individual program level. While all benefit economically from being short in duration, it does appear that some clearly cost more than others. For example, providing necessary nutrients involves little to no labor (other than possibly the initial diagnosis stage) and few institutional resources. On the contrary, intensive therapy programs such as MTFC will cost much more per participant. However, one might also expect such programs to demonstrate larger effects. Future research is certainly needed to provide cost-benefit comparisons between these short-term interventions, especially given their disparate nature.

Short-Term Interventions with Negative and Inconclusive Effects

As noted above, most intervention programs tend to be short-term in nature, given the lesser costs involved in their implementation. Not surprisingly then, there are nearly as many ineffective short-term programs as there are effective ones. Unfortunately, in some cases, these ineffective programs have received as much or more media acclaim as the effective ones. This likely has been one reason behind their perseverance in the face of their disappointing results.

Most of these programs can be characterized as being “tough” on delinquency, which can often lead to results opposite of those intended.

Juvenile Awareness Programs, Boot Camps, and Incarceration

Possibly the most publicized interventions are those that either incarcerate youth or attempt to rehabilitate them by scaring them with that possibility. The documentary “Scared Straight!” (Shapiro, 1978), and its subsequent sequels, brought widespread attention to efforts toward this latter goal. Accordingly, most people would be surprised to learn that these programs have received almost no empirical support, and some may even promote increased delinquency (e.g., Finckenauer, 1982; Finckenauer & Gavin, 1999; Petrosino, Turpin-Petrosino, & Buehler, 2003).

Petrosino et al. (2003) reviewed the literature on juvenile awareness programs, a category that broadly includes all programs for which juvenile delinquents are confronted with the prison environment (either through prison visits or interactions with prisoners). They chose only those studies that randomly assigned delinquents into no-treatment control or intervention (awareness) groups. In a meta-analysis of recidivism rates, the authors found that delinquents placed in the intervention programs were actually *more* likely to recidivate than those in the control groups. Indeed, none of the reviewed programs demonstrated a decrease for the intervention group. Lipsey (1992) reported similar results in his meta-analysis of these programs, suggesting that intervention participants were on average 7% more likely to recidivate than controls. Moreover, it appears to be even less effective to actually imprison delinquents than to simply scare them with the possibility. Multiple studies have reported recidivism rates for adjudicated youth at or above 50% (e.g., Beck & Shipley, 1987; Snyder & Sickmund, 2006).

A fellow traveler to these programs is the “boot camp” intervention. The boot camp approach places delinquents in a militaristic lifestyle, assuming that increased discipline and structure should promote self-control and decrease future recidivism (e.g., Empey, Stafford, & Hay, 1999; Gottfredson & Hirschi, 1990). Similar to juvenile awareness programs, the primary assumption underlying the boot camp approach is that it will scare first-time delinquents out of pursuing lifelong criminal activity (MacKenzie & Parent, 1991). However, these programs also have proven largely ineffective in reducing recidivism (e.g., Burns & Vito, 1995; Jones, 1996; MacKenzie, 1991; MacKenzie & Shaw, 1993). Some studies even suggest that these programs may even have detrimental affects (Jones & Ross, 1997; Morash & Rucker, 1990).

Another widely publicized program that has received little to no support is DARE (Drug Abuse Resistance Education). DARE programs attempt to decrease drug use largely through informing students of its prevalence and inherent risks. This program implicitly assumes that youth are deliberately weighing the risks of drug use prior to action, which fails to account for the possible implicit, situational influences on drug use (see e.g., Gibbons & Gerrard, 1995; Gibbons, Gerrard, Blanton, & Russell, 1998). However, ever since DARE programs were introduced in 1983 as part of the “War on Drugs” in the United States, most evaluations of their efficacy suggest that they either have no effect or in fact increase drug use (Lynam, Milich, Zimmerman, Novak, Logan, Martin, Leukefeld, & Clayton, 1999; MacKillop, Lisman, Weinstein, & Rosenbaum, 2003; Werch & Owen, 2002). Indeed, Lilienfeld (2007) recently provided DARE as an example of a program that “does harm” to its participants.

Why do these programs perform so poorly? And furthermore, why do programs with so little empirical support continue to receive government funding? With respect to the first question, one issue is that delinquents are subject to a variety of iatrogenic effects (Rhule, 2005).

Once one has been labeled as an adjudicated youth, this can lead differential treatment by those in the youth's social environment (Caprara, 1992; Dweck & Leggett, 1988). People in the community are likely to treat the adjudicated youth as less competent and trustworthy, which significantly complicates the readjustment process post-intervention. Indeed, others in the community are more likely to make negative attributions of the delinquent's actions (Dodge, 1980), and in turn may be more prone to aggression toward the child (Dodge & Frame, 1982). Finally, by congregating antisocial youth together in intervention groups, they might adopt more negative social norms because they now view antisocial activities as more ubiquitous and socially acceptable (e.g., Morash & Rucker, 1990; Stormshak, Bierman, Bruschi, Dodge, Coie, & the Conduct Problems Prevention Research Group, 1999). Youth in this situation also might increase antisocial behavior in an effort to "prove" to peers that the youth was not deterred or scared by the program.

With respect to the second question, a few reasons have been suggested regarding why these programs persist despite a lack of empirical support (Finckenauer, 2005). One of which follows from the field's general focus on cognitive ability factors. If one believes that delinquent activities result from deliberative decision-making, it seems logical that adolescents would engage in fewer risky actions if the negative consequences of these actions were made more salient. Another issue involves what is meant by program "efficacy." As demonstrated by the public interest in the Scared Straight documentaries, it is easy to get people to believe in a program by reporting on individual success stories. Compelling narratives lead people to believe that programs are making a difference if they can help "just one person." Finally, these programs, especially boot camps, have inherent appeal for those who believe that we need to "get tough" on delinquents. People who believe in a "strict" morality are likely to approve of

these seemingly harsher penalties (Lakoff, 2002), regardless of their lack of empirical support. This claim also provides rationale for why school suspensions and expulsions continue despite the fact that they often failed to reduce school violence (Skiba, 2002).

Job and Vocational Training

Counter to these approaches that take a hard line on delinquency, some programs seek to reduce delinquency by motivating youth toward more adaptive life commitments. Research frequently suggests that having adolescents commit to age-appropriate roles can decrease their likelihood for delinquency (Hirschi, 1969; Laub & Sampson, 2003; Sampson & Laub, 1993). However, adolescents who prematurely adopt adult roles might actually be more likely to commit delinquent acts (Hirschi, 1969). One example of an adolescent-appropriate role commitment is their entry into the workplace. Accordingly, research frequently has examined whether job training and vocational programs might help reduce delinquency.

Generally, the results of such programs are equivocal at best. In a meta-analysis of studies with juvenile offenders, job skills programs were found to have limited effects on recidivism (Lipsey, 2009). Another meta-analysis suggests that vocational education programs may even increase recidivism rates (Lipsey & Wilson, 1998; see also Bloom, Orr, Cave, Bell, Doolittle, & Lin, 1994). Two points though temper any strong negative conclusions. First, employment related programs appear more efficacious for non-institutionalized than for institutionalized offenders (Lipsey & Wilson, 1998). Second, there is great variability in this area with respect to program goals and methodological rigor, which can influence their reported effectiveness (Bouffard, MacKenzie, & Hickman, 2000). Given these points, it is difficult to make any broad conclusions regarding job-training programs other than they work for some delinquents some of the time.

Summation

The current section provides two important points. First, some short term interventions work. It is clearly not the case that small investments must necessarily result in small rewards. Changing nutrition or working with families are interventions that can be done in an expedient manner and they appear to work. Second, not all short term interventions work, which alludes to the fact that it is not the duration that matters but what one does that matters. But before drawing firmer conclusions we examine the longer interventions. It may be the case that we find certain parallels that may help identify critical features of successful interventions.

Long-Term Positive Interventions

We now progress to discussing interventions that take longer than six months on average. To implement and evaluate these interventions necessarily takes both more resources, and more time before one can make strong conclusions regarding their long-term benefits. Accordingly, less empirical support is available for these programs, and it is rare to find any that have been replicated by researchers outside of the lab that first created them.

Moreover, given the relative lack of evaluations of long-term interventions, long-term interventions also are underrepresented in meta-analyses. We therefore sought other sources for direction in selecting studies to review, and decided to follow the suggestions of the “Blueprints for Violence Prevention” program at the University of Colorado (Center for the Study and Prevention of Violence, 2009). The Blueprints program has evaluated hundreds of interventions and has nominated a few programs as being either “models” or “promising” for decreasing violent and antisocial behavior. We review three of these programs below as our examples of long-term positive interventions. It is worth noting that some of the short-term interventions

mentioned above were also nominated, including multisystemic therapy, multidimensional treatment foster care, and the Perry Preschool Project.

Olweus Bullying Program

We begin this section with one of the most consistent and well-received intervention programs to reduce aggressive behavior. The Olweus Bullying Program (Olweus, 1993, 1994, 1995) seeks to reduce bullying in schools using a multifaceted approach with training for students, teachers, and parents. The Olweus Program seeks to address the problem of bullying by first dissuading some myths on the topic. For example, bullying does not occur because of larger class sizes, failure in school, or differences in students' appearances. Instead, bullies are marked by their generally aggressive and antisocial dispositions, an important point given its implications for interventions.

At the school level, teachers receive training to better diagnose and monitor bullying behavior. They also are taught how to engender better social skills among their students. In class, students engage in role-playing scenarios and cooperative groups to practice better social interactions. When bullying does occur, either in the classroom or on the playground, teachers have serious discussions with both the bully and victim. It is of the utmost importance that teachers do not allow even minor cases of bullying behavior to persist in the classroom. Moreover, teachers report these problems to the parents of the students, who also play an important role in discouraging bullying behavior.

At the family level, parents also receive training on how to discern the signs of aggression and bullying at home. They are expected to maintain consistent rules and disciplinary practices to deter their children from aggressive behavior. Parents are taught to identify even seemingly minor signs of bullying and aggression, such as damaged schoolbooks and cuts or

bruises. These small signs can be indicative of victimization, and should be reported to teachers and staff during parent-school meetings. In addition, parents should keep a close eye on their child's friends and social activities, which will help teachers get a better idea of which students are involved.

Olweus (1991, 1995) reviewed the evidence on program effectiveness in a large sample of students from grades 4 to 7, following these students over a span of 2.5 years. Bullying decreased by at least 50%, and general antisocial behavior was markedly reduced. More broadly, the program had positive effects on the general school environment. Teachers reported more positive peer interactions, and better attitudes toward schoolwork. Although other reviews have demonstrated somewhat smaller effect sizes, the program has consistently demonstrated reductions in bullying behavior over the past two decades (Limber, 2006; Olweus, 2005). Moreover, these effects tend to get stronger with time (Olweus, 2005), demonstrating significant dosage effects. While future work is needed to better investigate possible moderators and mediators of these effects (Limber, 2006), this program remains one of the most effective for reducing aggressive and antisocial behavior in the literature.

Life Skills Training

Life skills training programs (LST; Botvin, Eng, & Williams, 1980; Botvin & Griffin, 2004) seek to discourage drug use among early adolescents. Intervention sessions involve teaching adolescents self-management skills (goal-setting, problem-solving), social skills (ability to interact with others), and drug-related information (consequences and skills to reduce peer drug influences). Often these sessions occur in the school with teacher assistance, because schools provide a ready opportunity to sample several adolescents at the same time. With respect to its goals and methods, LST clearly mirrors some of the social skills programs mentioned

above. However, LST includes “booster” sessions on these topics for an additional two years time.

LST programs have consistently demonstrated efficacy in reducing drug use in both small-scale and large-scale study implementations (for a review, see Botvin & Griffin, 2004). For example, Botvin, Griffin, Diaz, and Ifill-Williams (2001) report that intervention participants were less than half as likely to report binge drinking than control adolescents at both 1- and 2-year follow-ups, demonstrating the long-term effects of LST programs. Using the wealth of data on these programs, researchers have been able to identify a number of mediating variables that might partially account for the evidenced decreases in drug use (Botvin & Griffin, 2004). Some possible mediators include participants’ attitudes toward drugs, their perceived norms of drug use, assertiveness, decision-making, and refusal skills. It is worth noting that several of these are similar to those mentioned above with respect to the short-term interventions.

Seattle Social Development Project

The Seattle Social Development Project (SSDP) is a school-based approach that extends into the family environment (Hawkins, Catalano, Morrison, O’Donnell, Abbott, & Day, 1992; Hawkins, Smith, Hill, Kosterman, & Catalano, 2007). The program posits that children can follow either a prosocial path, which serves as a protective buffer, or an antisocial path, which serves to promote delinquent and problem behaviors. The overarching goal of the program is to motivate youth toward the prosocial path, and away from the influence of deviant and delinquent peers.

The first stage of implementation occurs at the teacher level. Teachers are trained to implement more prosocial and cooperative activities in their classrooms. Emphasis is placed on providing students with opportunities to learn in small groups, and implementing consistent

disciplinary and reward practices. Methods are specifically tailored to provide age-appropriate instruction for students from 1st to 6th grade. After appropriate training, teachers are told to integrate these practices into their daily curriculum, providing students with consistent doses of the intervention. Students then progress through the school years, receiving the preventive intervention for as many years as their school system allows. This allows for the long-term development of communication, social, and decision-making skills.

The second stage of intervention involves parent-training sessions. Again these sessions are tailored to provide parents with information specific to their child's current stage of development. Early on, parents are taught appropriate disciplinary techniques, including child-monitoring skills. Later they learn methods for discouraging their child's drug use. Each year, parents are provided with the opportunity to take part in these training sessions, which are not particularly time consuming (only 4-7 sessions per year).

The SSDP has demonstrated efficacy in addressing its primary program goals. Receiving two years of the intervention reduced aggressive and antisocial behavior among Caucasian boys compared to the control group (Hawkins, Von Cleve, & Catalano, 1991). After receiving four years, intervention participants scored better on a number of family and school outcomes, including family management and communication, and school commitment and attachment (Hawkins et al., 1992). In addition, intervention students reported less initiation of delinquent and alcohol-related behaviors. Finally, studies have assessed whether these effects are lasting by sampling intervention participants at age 21 (Hawkins, Kosterman, Catalano, Hill, & Abbott, 2005; Lonczak, Abbott, Hawkins, Kosterman, & Catalano, 2002). Overall, full intervention participants performed better on several measures of general life outcomes (high school graduation, current employment), mental health, crime, and sexual behavior (see Hawkins et al.,

2007 for a review). Therefore, it appears that the intervention continued to lead to positive outcomes even into emerging adulthood. However, since the long-term effects of this intervention are sometimes small and nonsignificant (see e.g., Hawkins, Catalano, Kosterman, Abbot, & Hill, 1999), further research is needed to investigate possible mediators and moderators of intervention efficacy.

Long-Term Negative and Inconclusive Interventions

Obviously a number of projects could be reviewed in our final category, since most long-term interventions can be considered as having “inconclusive” support. We therefore chose to mention a couple in hopes of sparking interest for future work. It is worth emphasizing that we are not saying these are *negative* programs, but rather that “the jury is still out” regarding their effectiveness.

Positive Youth Development

Positive youth development (PYD) programs counter the traditional approach of identifying “negatives” and addressing them. Instead, PYD programs posit that youth possess the potential for “good,” which should be nurtured by the community (Benson, 2003; Lerner, 2004; Lerner et al., 2005). PYD programs focus on promoting social competence and connectedness, resilience, and the adoption of prosocial standards. To achieve these ends, PYD programs often work with youth throughout their development in multiple areas (family, school, and community). This movement is relatively recent, and thus these programs have had relatively fewer empirical tests. However, recent work does support the claim that PYD programs can decrease youth’s propensity to take part in delinquent activities.

Lerner and colleagues (Jelicic, Bobek, Phelps, Lerner, & Lerner, 2007; Lerner et al., 2005) have investigated PYD using a longitudinal investigation of 4-H programs. 4-H is a

program funded by the Department of Agriculture in the United States, which provides youth with opportunities to learn about science and farming using cooperative group activities (The 4-H story, 2009). Youth are able to participate in these programs from early childhood into adolescence. Jelcic et al. (2007) assessed 4-H participants as 5th and 6th graders on indicators of the five primary PYD goals (caring, character, connection, competence, and confidence), as well as adaptive and maladaptive outcomes. They demonstrate that youth higher on the PYD goals at 5th grade were less likely to take part in risk behaviors at 6th grade (delinquency and substance use). It thus appears that promoting PYD can decrease crime behaviors among youth.

While researchers are increasingly looking into PYD approaches (see Catalano et al., 2002 for a review), the 4-H study and the SSDP are two of the few PYD programs that have systematically assessed their efficacy in reducing problem behaviors. Instead, PYD approaches tend to assess only adaptive outcomes, such as markers of the five primary goals mentioned above (Catalano, Berglund, Ryan, Lonczak, & Hawkins, 2004). Given that the PYD movement has emphasized its distinction from past risk-prevention approaches, it is unsurprising that most programs tend to focus on the positive (Schwartz, Pantin, Coatsworth, & Szapocznik, 2007). However, most of the PYD goals clearly resemble those mentioned above as detractors to crime and delinquency, such as social competence and cooperation. One therefore would predict that PYD approaches should similarly prove efficacious in reducing problem behaviors; however, this research has largely yet to be performed given the recency of the PYD movement. To this end, Schwartz et al. (2007) suggest that future research on interventions need to integrate ideas from risk-protection and PYD approaches to provide the most thorough solutions to the problems of youth.

Prison-Based Interventions

A second set of interventions with inconclusive results focuses on rehabilitation programs within prison populations. While these intervention programs sometimes last less than six months, we classified these long-term given that the length of imprisonment itself probably should be included when considering whether they decrease recidivism post-release. A recent meta-analysis suggests that prison interventions can be effective in reducing prison misconduct (French & Gendreau, 2006). Moreover, the interventions that proved effective in reducing misconduct also were shown to decrease levels of recidivism after release. Therefore, although imprisonment itself might be a poor deterrent, as noted above, there are ways to help decrease recidivism even within the prison environment.

In the meta-analysis, behavioral programs appeared to be most effective for reducing problem behavior (French & Gendreau, 2006). It is worth noting that this category was rather inclusive in nature, containing approaches using behavioral, cognitive-behavioral, and social learning techniques. This was contrasted against “non-behavioral” programs that included everything from group interventions to nutrition programs. Clearly then, there is great heterogeneity in the types of interventions employed in prisons. Moreover, the meta-analysis indicated large levels of heterogeneity in the results of these programs, with some fairly strong outliers. This is one reason why we chose to consider the evidence on prison interventions as inconclusive, despite the positive effects on average for both behavioral and non-behavioral programs. It is worth noting that both of these categories fared better than educational/vocational interventions, which failed to demonstrate a positive effect.

Another reason to classify this initial evidence as inconclusive is that several elements of the prison system impede the ability for rigorous evaluation of these programs. For one, levels of overcrowding differ dramatically across prisons, which can have profound effects on

implementation efficacy. In addition, it is often difficult to not only get information on prisoners' misconduct records, but also to code these for levels of relative severity. Therefore, interventions might work for some prisons and for some prisoners that fail to show effects in other contexts. Future research thus needs to conduct more thorough on-site evaluations, and focus on rigorous program implementation (French & Gendreau, 2006).

Social Cognitive Skills Training

We end our review of long-term negative and inconclusive interventions by examining recent work on programs to develop interpersonal skills from a social cognitive framework. As noted above, the effects of the social environment on delinquency are well replicated (Thornberry & Krohn, 1997), and programs to address social skills in the short-term appear beneficial on the whole. It is interesting then to compare these effects to those of programs addressing this topic through a social cognitive lens. While such programs obviously incorporate a cognitive framework, we mention them here because their intentions are not to address delinquency through increasing intelligence. In addition, these programs have demonstrated markedly different results from the social skills programs addressed above, and thus provide an interesting contrast.

Deviant youth have been shown to interpret social situations differently from "normal" youth. Aggressive youth are more likely to attribute others' actions as signs of hostility (e.g., Dodge, Price, Bachorowski, & Newman, 1990; MacBrayer, Milich, & Hundley, 2003; Slaby & Guerra, 1988). Moreover, hostile and aggressive individuals appear to attend more to aggressive cues and actions than nonaggressive individuals (Dodge, Lockman, Harnish, Bates, & Pettit, 1997; Zelli, Huesmann, & Cervone, 1995). To address these issues, social cognitive interventions target the youth's social information processing skills on several levels. These

interventions intend to lead youth toward, among other outcomes, (a) better attention to and interpretation of social cues, (b) more adaptive action goals and scripts, and (c) better activation and retrieval of these scripts, which in turn promotes more adaptive responses to social situations (see e.g., Crick & Dodge, 1994; Huesmann, 1998). These efforts often take place over multiple years, and incorporate teachers, counselors, and parents in the intervention process.

Evidence for these programs though can be viewed as, at best, equivocal. They can be successful in targeting their proximal outcomes, such as social cognitive skills (for a meta-analysis, see Beelmann, Pfingsten, & Lösel, 1994). There is much less support though for the long-term nature of these effects, or that these interventions in fact decrease problem behaviors. One study reported moderate, but significant, decreases in conduct problems between the intervention and control groups (Conduct Problems Prevention Research Group, 2002). However, not all indicators of conduct behaviors showed significant differences, and even some indicators of social cognitive skills also failed to reach significance. More recent work paints an even less promising picture. A multisite study evaluation was recently conducted for the GREAT program (Guiding Responsibility and Expectations in Adolescents Today and Tomorrow; Meyer, Allison, Reese, Gay, & Multisite Violence Prevention Program, 2004; Orpinas, Horne, & Multisite Violence Prevention Program, 2004; Smith et al, 2004), which demonstrated that social cognitive interventions might instead have detrimental effects (Multisite Violence Prevention Project, 2009). Indeed, youth who received the universal intervention (participants were not selected based on risk) demonstrated significant *increases* in aggression and the endorsement of norms supporting aggression.

Generally, two points are worth noting with respect to social cognitive skills interventions. First, these interventions appear more effective for high-risk children, and thus

should not be universally applied. While the program had negative effects when applied universally, the effectiveness of the GREAT program was moderated by the child's level of risk (Multisite Violence Prevention Project, 2008, 2009). Children appeared to benefit more (or in some cases, be less negatively affected) when they were classified as having multiple risk factors. However, even in these studies, often only those participants reporting with at least half of the examined risk factors actually demonstrated positive effects. Second, such programs might be cost-effective only for the highest-risk group (Foster & Jones, 2007), given that the cost per child can exceed \$50,000. Perhaps then the most optimistic appraisal of these interventions is that they are burdened by the idiosyncrasy and nuance of their effects. These programs only appear to help a select group of youth, and at a particularly prohibitive cost. Indeed, this idiosyncrasy is underscored by recent pilot work in Scotland that found much more variation between different schools within a treatment category than between schools from different treatment categories (Sharp & Davids, 2003).

Summary and Conclusion

In this review, we examined the initial work on interventions for antisocial behavior that addresses the problem by focusing on factors other than cognitive ability. As is evident throughout, a number of these programs show promise in their ability to reduce delinquent actions. A few common themes across this review are worth noting. First, with respect to intervention duration, the conclusions are more ambiguous than portrayed in the literature. It does appear that single-dose interventions are unlikely to demonstrate strong results. However, short-term interventions can demonstrate significant effects, and often there is more evidence in favor of their efficacy than currently available for long-term programs. Therefore, conclusions about duration are tempered by what one means by "short" and "long." Our review does

contradict a strict interpretation of duration benefits, insofar that longer is not always better. We would hasten to add that extremely short-term approaches seem ineffective. Possibly the best message to take home regarding duration is that it is not as clear a predictor of efficacy as it has been portrayed at times in the literature.

Second, it is clear that interventions in any domain need to emphasize rigorous and consistent implementation. For example, with respect to school-based programs, teachers and parents must set forth clear directions and rules for youth, and those who break these rules must be disciplined in a consistent fashion. Several programs reviewed sought to train teachers and parents to better identify and respond to youth problems. Therefore, it appears that one mark of an effective intervention is whether it is rigorously implemented. Indeed, meta-analyses show that implementation integrity is a significant predictor of program efficacy (Lipsey & Wilson, 1998), and even suggest that the best advice for schools is to choose the program that they have the most faith that they can implement (Wilson & Lipsey, 2007).

Third, interventions should incorporate the family environment in some capacity. This is evident both with respect to the short-term effective programs (e.g., functional family therapy and parent management training), and the long-term ones (e.g., the Olweus program and the SSDP). The family system is the most proximal to the youth (Bronfenbrenner, 1979), and thus it is unsurprising that programs are most effective when they target the family. Family-based programs also tend to be among those deemed most effective in meta-analyses (Lipsey, 2009; Lipsey & Wilson, 1998).

Fourth, as made evident by programs emphasizing social skills, interventions should motivate youth to develop more effective strategies for dealing with social situations. Youth offenders often are less adept at interpreting social situations (Dodge et al., 2003; Gouze, 1987),

which can serve as a catalyst for deviant activities. Social skills training thus can help youth not only by teaching them appropriate social schemata for future use, but also by providing youth the opportunity to practice these skills. Through practice, such skills can become routinized and readily accessible to the youth for use in future interactions. This again harkens the idea that interventions work best with consistent doses over the long-term, since single-shot approaches would fail to allow youth the practice necessary to make these social skills accessible.

The gestalt one takes from the effective interventions is that they should either affect physiological systems or entail a high degree of immersion, which we would differentiate from dose or length of intervention. By immersion, we mean that a significant portion of the juveniles social structures are all dedicated to changing or limiting the behavior of the juvenile. So, for example, family appears to be an effective vector for intervention, presumably because family constitutes one of the most important, multifaceted structures in the lives of children and juveniles. Similarly, interventions like the Olweus Bullying program act on all of the major social structures that children face, such as school, peers, and family, and are highly effective. In turn, physiological interventions, though apparently non-immersive, may mimic some of the effects of pervasive social control on psychological outcomes. One possibility is that the serotonergic system is at the root of the psychological systems responsible for the variety of behaviors associated with delinquency and criminality.

Interestingly, pervasive and consistent social environments have been hypothesized to be the most likely types of environments to affect change in personality traits (Roberts, Wood, & Caspi, 2008). Ironically, despite the fact that personality traits are clear risk factors for criminal activities, the interventions we reviewed seldom assessed changes in personality, presumably because researchers often make the mistake that they are unchangeable (Roberts & Caspi, 2001).

That being said, many of the interventions detailed above may be working exactly because they are facilitating fundamental changes in the personalities of the children and adolescents who are participating in the interventions. For example, several of the desired intervention outcomes can be readily designated as facets of conscientiousness (Roberts et al., 2005). Conscientiousness is a family of traits marked by subfacets such as industriousness, impulse control, decisiveness, orderliness, responsibility, and conventionality; the latter focusing on following rules and norms. Any decrease in crime and delinquency implicitly suggests that the delinquent is demonstrating better adherence to the rules of conventions of society, as well as improved impulse control. Even having to adhere to intervention guidelines should motivate one to be more reliable and punctual, and to follow the order and conventions of the specific intervention. Second, several programs emphasized problem-solving and decision-making skills, often in social or family contexts, which are direct initiatives to promote decisiveness. Third, to the extent that job training or educational initiatives work, these types of programs appear to be directly designed to promote the industriousness. Accordingly, developing interventions for conscientiousness should serve as a primary goal for future research.

It too is worth noting that some programs might have also served to promote greater agreeableness amongst youth. Agreeable individuals are marked by their cooperation and trustfulness (e.g., Costa & McCrae, 1992). It thus is unsurprising that several of the most effective programs were those that taught youth better social and life skills. In addition, the more effective school-based programs were those able to motivate agreeableness at the school-level (e.g., general school ethos and affection). Moreover, it is clear that the family context would be a primary target for interventions to increase agreeableness, because temperament quality and emotional stability early in childhood might serve as antecedents for the display of agreeableness

later in life (e.g., Graziano & Eisenberg, 1997). It even appears that the recent PYD movement posits the promotion of agreeable behavior as a primary objective. Indeed, three of the five indicators of PYD (Lerner et al., 2005) – character, connection, and caring/compassion – would be similarly indicative of an agreeable individual. Since agreeableness counterindicates delinquency (Lynam et al., 2003), we believe that PYD programs have promise for decreasing rates of crime and delinquency among youth, even though they currently have relatively less empirical support.

Of course, there are very little direct data to support the idea that these interventions are affecting change in personality. In fact, despite focusing so strongly on bullies, even the Olweus Bullying program has failed to track whether the personality of bullies changes over time as a result of their interventions. However, there are some indirect data to support this inference. First, personality traits do change and often change at ages typically not entertained, such as middle age (Roberts, Walton & Viechtbauer, 2006). Moreover, the changes in personality traits found in young adulthood and middle age are often correlated with social environmental factors associated with overcoming criminal activities, such as stable marriages (Robins, Caspi, & Moffitt, 2002; Roberts & Bogg, 2004), and successful occupational experiences (Roberts, Caspi, & Moffitt, 2003). These associations are surprisingly similar to the theories of social control that propose that experiences in work and marriage can lead to a desistance from a life of crime (Sampson & Laub, 1990). Finally, there is a nascent literature on the changeability of personality through direct therapeutic intervention. Several studies have shown that personality traits change when individuals successfully complete some form of therapy for disorders such as depression (Piedmont & Ciarrocchi, 1999; De Fruyt, Van Leeuwen, Bagby, Rouillon, & Rolland, 2006). More recently it was shown that a mindfulness intervention for doctors also resulted in

personality trait change, especially in the domains of conscientiousness and neuroticism (Krasner et al., 2009). Finally, coming full circle with the nutrition interventions that appear to be affecting serotonergic functioning, a recent study showed that taking serotonin reuptake inhibitors resulted in personality trait change and that the reductions seen in depression were largely a result of this change (Tang et al., 2009).

We therefore suggest that several of the programs reviewed here might demonstrate positive effects by virtue of their ability to change personality traits. To this end, one clear direction for research is to design and implement interventions for promoting more adaptive personality traits, such as conscientiousness, agreeableness, social self-confidence, and emotional stability. We nominate these personality dimensions because they have been previously designated as indicators of greater maturity (Hogan & Roberts, 2004), a construct seemingly antagonistic to delinquent and unlawful action.

Conclusion

In conclusion, we wish to end on the positives rather than the negatives. Throughout this review, it is clear that youth are not condemned to life of crime. Instead this work demonstrates the multifinality inherent in this population. Accordingly, one must not characterize these youth as “hopeless” which in turn leads one to avoid intervening. Moreover, in our review, we hope to have debunked two myths regarding how to intervene. First, researchers need not be overwhelmed by the perceived demands of implementing intervention programs. Our review demonstrates that relatively short-term and easy-to-implement programs can demonstrate significant effects (e.g., health-based interventions). Second, non-cognitive interventions can have as strong, if not stronger, effects than programs targeting IQ or the environment. Several factors influence the development of delinquency, and accordingly, a single-minded focus on

intelligence seems misguided. While Descartes famously decreed, "I think therefore I am," intervention researchers should take note that we are more than what we think.

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Table 1: A comparison of cognitive, environmental, and non-cognitive predictors of different criminality outcomes in selected studies.

Predicting Moderate / Serious Delinquency in Males (Loeber et al., 2007)

Cognitive Factors (top five)	
High verbal IQ	-.16
Good performance on Continuous Performance task	-.13
Low delayed visual memory	.12
Low immediate visual memory	.11
High delayed verbal memory	-.10
Child Factors (top five)	
High marijuana use	.43
High drug selling	.42
High truancy	.39
High alcohol use	.37
High tobacco use	.34
Family Factors (top five)	
High parental supervision	-.22
High parental stress	.13
Low positive parenting	.12
Peer Factors	
High peer delinquency	.36
Community Factors (top five)	

Low community crime (youth report)	-.26
Good housing quality	-.19
Low community crime (parent report)	-.18
Poor housing quality	.07

Predicting Desistance from Delinquency in Males (Loeber et al., 2007)

Cognitive Factors (top five)

Low immediate visual memory	.12
High spatial IQ	-.06
Poor performance on Continuous Performance task	.06

Child Factors (top five)

High interpersonal callousness	.18
High tobacco use	.16
High drug selling	.14
High alcohol use	.13
High perceived likelihood of being caught	.12

Family Factors (top five)

High parental supervision	-.07
High parental stress	.05
High physical punishment	.04
High positive parenting	-.03

Peer Factors

High peer delinquency	.18
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Community Factors

Low community crime (parent report)	-.10
Poor housing quality	.07
High community crime (youth report)	.04
High community crime risk (parent report)	.02

Predicting Recidivism (Meta-Analysis by Cottle et al., 2001)

Cognitive Factors (top five)

Standardized achievement score	-.15
Full scale IQ score	-.14
History of special education	.13
Verbal IQ score	-.11
Performance IQ score	-.03

Child Factors (top five)

Nonsevere pathology (e.g., stress, anxiety)	.31
Conduct problems	.26
Effective use of leisure time	.23
Substance abuse	.15
Severe pathology	.07

Family Factors

Family problems	.28
History of abuse	.11
Single parent	.07

Parent pathology	.05
Peer Factors	
Delinquent peers	.20

Predicting Conduct Problems (Gerard & Buehler, 2004)

Cognitive Factors

Scholastic achievement	-.24
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Child Factors

School detachment	.33
Self-esteem	-.20
Perceived prejudice by students	.08

Family Factors (top five)

Family detachment	.31
Parent's relationship quality	-.17
Parent's marital status	-.13
Parental involvement	-.13
Household size	.10

Peer Factors

Trouble with peers	.20
Peer support	-.17

Community Factors

Neighborhood satisfaction	-.13
Neighborhood safety	-.09

Neighborhood quality	-0.07
Neighborhood problems	.07

Predicting Stability of Conduct Problems from Personality (Miller et al., 2003)

Neuroticism (top five)

Angry Hostility	.30
Impulsiveness	.22
Depression	.15
Self-Consciousness	.02
Vulnerability	.03

Agreeableness (top five)

Straightforwardness	-.47
Compliance	-.37
Altruism	-.30
Trust	-.24
Tendermindedness	-.12

Conscientiousness (top five)

Deliberation	-.35
Dutifulness	-.23
Competence	-.22
Achievement striving	-.15
Self-discipline	-.15