SELECTION OF LEVELS OF PREVENTION

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Abstract — This article outlines the advantages and disadvantages of universal and targeted intervention programs. Two advantages of universal programs are the absence of labeling and stigmatization, and the inclusion of the middle class which makes it more likely that the program will be well run. Two disadvantages are that they are unappealing to the public and politicians, and they may have their greatest effect on those at lowest risk. Targeted programs have the potential of addressing problems early on, and are potentially efficient if targeting can be done accurately. Disadvantages include difficulties around screening and the possibility of labeling and stigmatization. The argument is put forth that what is needed to reduce the immense burden of suffering from child and adolescent psychiatric disorders is the optimal mix of universal, targeted, and clinical programs carried out in the context of a civic community. There will always be trade-offs among these strategies, and the elements of the combination will change as knowledge accumulates. © 2000 Elsevier Science Ltd.

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The usual classification system for prevention initiatives is to divide them into primary, secondary, or tertiary (Caplan, 1964; Cowen, 1983). The goal of primary prevention programs is to reduce the incidence or number of new cases of a disorder. The aim of secondary prevention is to lower the prevalence of disorder by early identification and effective treatment, and tertiary prevention focuses on rehabilitation with the purpose of reducing the severity of impairment associated with an established disorder. A troublesome problem with this classification is that distinguishing between the presence or absence of disorder (and thus between primary and secondary prevention) is difficult or impossible because the determination of the threshold for disorder, when the frequency and severity of symptoms occur on a continuum, is not based on firm rational criteria, but is arbitrary (Boyle, Offord, Racine, Sanford, & Fleming, 1996; Offord, 1987).

More current conceptualizations have moved away from classifying prevention initiatives as primary, secondary, or tertiary, towards a classification system centering on who is offered the intervention (Institute of Medicine, 1994; Offord, Kraemer, Kazdin, Jensen, & Harrington, 1998). This system results in two kinds of programs, universal and targeted. This paper compares the advantages and disadvantages of these two approaches, and also discusses the importance of a civic community. It considers the steps that may be taken to arrive at the optimal mix of programs to reduce the burden of suffering from child and adolescent psychiatric disorders and ends with brief concluding remarks.

UNIVERSAL PROGRAMS

In a universal program, all residents in a geographic area as large as a country, or much smaller, such as an individual community or school, are offered the program.
The residents do not seek help, and no one within the population is singled out for the intervention. The setting itself may be a high-risk one for the disorders or conditions in question, but if the intervention is not targeted at specific individuals within the population, then the intervention strategy is classified as universal.

Universal programs have several advantages and disadvantages, and they are outlined in Table 1. A major advantage is that there is no labeling or stigmatization of individuals since the program is offered to all persons in the setting. A second advantage is that in universal programs the middle class is involved, and this can ensure that the program will be well-run. In the children’s field, for example, the parents of economically disadvantaged offspring compared to the parents of middle-class children can find it more difficult to complain to supervisors or teachers, and demand changes be made to a badly run program. A further advantage of a universal program is that it prepares the setting or “tills the soil” for subsequent targeted programs. For example, offering a social skills program only to certain youth in a population, with no universal social skills programs present, runs the risk of labeling or stigmatizing the identified adolescents. However, with a universal social skills program in place, it becomes much easier, against this background, to provide certain youth a more intense social skills program in a way that minimizes labeling and stigmatization. This becomes particularly important in the case of antisocial behavior in children and youth where there is evidence that labeling children as antisocial may escalate the frequency and severity of their antisocial behavior (Farrington, 1977; Robins, 1974).

Another advantage of a universal program is that the elements of the program can be directed at community-wide causal risk factors, while targeted programs focus on intervening on causal risk factors that distinguish the high-risk from the low-risk group within that community (Rose, 1985). For example, suppose there are two communities, A and B, where A has a much higher rate of conduct disorder than B. A targeted approach, within community A, would center on reducing the effects of a causal risk factor that distinguishes the high-risk group from the low-risk group in that community. A community-wide approach, on the other hand, would address a risk factor that puts the entire community at risk for increased rates of conduct disorder. It may be, for instance, that the major reason community A has higher rates of conduct disorder compared to community B is that community A has much fewer well-run day care centers than community B. The primary need in community A, then, is not for an intervention aimed at a high-risk group within that community, but for a community-wide intervention, in this case, increasing the number of effective day care centers. A universal strategy supports such an intervention.

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<tr>
<th>Advantages</th>
<th>Disadvantages</th>
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<tr>
<td>No labeling or stigmatization</td>
<td>May be unappealing to the public and politicians</td>
</tr>
<tr>
<td>Middle class insists that the program be well run</td>
<td>Small benefit to the individual</td>
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<tr>
<td>Provides a setting or “tills the soil” for targeted programs</td>
<td>May have the greatest effect in those at lowest risk</td>
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<tr>
<td>Provides the possibility for focusing on community-wide contextual factors</td>
<td>Unnecessarily expensive</td>
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<td>Behaviorally appropriate</td>
<td>Nonhigh-risk population denied the opportunity of doing good</td>
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<tr>
<td>Marked potential at the population level</td>
<td>Community initiatives may be undermined</td>
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<td>May be perceived by the low-risk population as being of little benefit to them</td>
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<td>Hard to detect an overall effect</td>
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There are two further advantages of a universal approach. The first is that by not identifying individual children, and focusing on changing their behavior in a context where all children exhibit some of this behavior (but not as much as in the high-risk group), there is no expectation that these high-risk children change their troublesome behavior in a milieu where all children are exhibiting this behavior. For example, it is difficult for children with marked behavior disorders to change their behaviors when they are living amongst children who have high levels of the same behaviors. Lastly, although universal programs cannot be expected to have major beneficial effects on individuals within a population, the overall population effects can be substantial. For example, an intervention aimed at raising the IQ scores of a population of children may result in gains on scores for individual children of only 1 or 2 points, but the gains for the population as a whole, summing across the gains in individuals, would be considerable.

Universal programs have a number of disadvantages. First, they may have little appeal to the public or politicians. They don’t deal with high profile clinical cases, and they may raise sensitive concerns about social engineering or about interfering with personal freedoms or meddling in family business. Second, there is only a small benefit to the individual. Third, although one of the aims of universal programs is to reduce the inequality among groups of children in a population, there is the fear that they may have the opposite effect. For example, there is the worry that a universal program aimed at reducing the level of antisocial behavior in a population of children, may have its greatest effect on those children with low levels of antisocial behavior. The program may end up making “nice kids even nicer,” but may have no appreciable effects on those children with high levels of antisocial behavior. A comforting result in this regard is a recent report showing that the beneficial effect of a universal conduct disorder prevention program was greatest among those children with the most aggressive behavior (Stoolmiller, Eddy, & Reid, 2000). Nevertheless, universal programs aimed at benefiting economically disadvantaged children and their families can end up benefiting middle-class families and their children to a greater extent (Howe & Longman, 1992; Jones, 1994).

A fourth disadvantage of a universal program is that it may be unnecessarily expensive. For example, if the aim of a universal program is to prevent a clinical disorder with an outside prevalence rate of 20% in adolescents in the community, then 8 of 10 of the adolescents do not require the intervention. The next three disadvantages focus on the reactions of the non high-risk group. The fifth disadvantage is that with a universal program in place, the non high-risk group, who under ordinary circumstances are motivated to help the less fortunate, may feel now that their efforts are not needed because the universal program will fulfill these needs. Similarly, the sixth disadvantage of universal programs is that the low-risk population may feel that community initiatives that they are committed to set up to aid the high-risk population are no longer required because of the existence of the universal program. The seventh disadvantage is that the low-risk population may be unenthusiastic about a universal program because they feel the unstated purpose of such a program is to serve the high-risk population. What can irritate the members of the low-risk population is that this unstated purpose is fulfilled under the guise of providing a program for all children.

The eighth and last disadvantage of a universal program is that it is difficult to demonstrate an overall beneficial effect. The reasons for this have been discussed in detail (Hundert et al., 1999). One of the major reasons is that when intervening at a population level, most members of the population either will not have any of the behavior that is to be prevented, or at least will not exhibit very much of it. Thus, they either cannot show any improvement in the behavior, or at most only a small amount. At the
other end of the spectrum, since a universal program, because it is delivered to a large
number of individuals, will necessarily be of low intensity, it cannot be expected to
produce marked positive results in that small proportion of the population that has
high and severe levels of the behavior of interest. Universal programs can be expected
to have their most beneficial effect on that relatively small group of individuals in a
population who have mild forms of the targeted behavior. Even if a universal program
is highly effective with this subgroup, the overall population effects of the program
cannot be expected to be marked. Some of the other reasons that make it difficult to
demonstrate large beneficial effects in universal programs have to do with the unit of
intervention, which is usually not individual children, but populations of children. For
example, in the Tri-Ministry Study (Boyle, Cunningham, Heale, & Hundert, 1999;
Hundert et al., 1999), where the aim was to prevent antisocial behavior in children
from kindergarten to grade 3 by providing universal, social skills, and academic en-
richment programs, the unit of assignment both to the experimental and control
groups, and for analysis, was the school. Immediately, this puts a limit on sample
size—it is the number of schools, not the number of individual children in the schools.
This, in turn limits the power of the analysis. This limitation in sample size leads to a
second problem. If the unit of assignment for randomization is individual children, not
schools, then it would be expected, with hundreds of subjects, that the randomization
procedure itself would deal with differences among subjects on relevant prognostic
variables. However, this might not occur when schools are the unit of assignment. It
may be that important differences among schools on relevant prognostic variables in
the experimental and control schools will remain after randomization, and these dif-
fervences may play an important part in muting the effective size of the intervention.

Another related issue is that when institutions such as schools volunteer for participa-
tion in a study, they may already be on positive trajectories for a reduction in the be-
havior of interest. One reason the schools volunteer for the study is because they al-
ready have a record of impressive accomplishments with their student population. In
addition, the selection procedure itself may stimulate positive changes reducing the
targeted behavior. Further, the act of monitoring the behavior may encourage the
school to introduce changes it already was contemplating. One or more of these mech-
anisms may have been responsible for the striking finding in the Tri-Ministry Study of
marked positive trajectories in outcome measures for children in both the noninter-
vention or comparison schools, and in the experimental schools. Thus, for the inter-
vention to be judged as being effective, the positive behavioral trajectories in the inter-
tervention schools would have to be more marked than the expected positive
trajectories in the nonintervention schools.

A final reason that makes it difficult to demonstrate a positive effect in universal
programs is that by the time the decision is made to evaluate universal programs, the
elements of the program are already widely disseminated (e.g., Winkleby, 1987). Also,
as noted above, diffusion of the program can be expected to occur during the time of
the intervention. In the Tri-Ministry Study, interventions similar to the ones in the ex-
perimental schools were present in the comparison schools. For example, in the year
prior to the study, more than one-third of the teachers in the comparison schools
stated that they taught social skills as a special subject; this increased to half the teach-
ers by the fourth year of the study. In this case, the social skills program in the exper-
imental schools was pitted against existing social skills programs in the comparison
schools, thus setting the bar high to show effectiveness of the intervention program in
the experimental schools.
TARGETED PROGRAMS

In a targeted program, the hoped-for recipients of the program do not seek help, but rather they are singled out for the intervention. They are identified as in need of the intervention because they are thought to be at high risk for the disorder or condition of interest. Children and adolescents can be identified as being at high risk on the basis of characteristics they themselves have, or on the basis of the group to which they belong. An example of the former would be children who have mild antisocial symptoms, and although they currently do not qualify for conduct disorder, they are at increased risk for it (Lipman, Bennett, Racine, Mazumdar, & Offord, 1998). Targeted interventions using this strategy to identify the high-risk group have been termed indicated preventive interventions (Institute of Medicine, 1994). An example of the latter strategy in identifying a high-risk group would be focusing on the offspring of parents on social assistance. This population of children are at much increased risk for emotional and behavioral problems (Offord, Boyle, & Jones, 1987). Programs identifying the high-risk group in this manner have been classified as selective preventive interventions (Institute of Medicine, 1994).

The advantages of targeted interventions include the possibility of addressing problems early on, before they become severe and entrenched and are accompanied by marked associated impairments. A second potential advantage is that they can be efficient since available resources are directed only at the high-risk group. Both these potential advantages depend on the ability to identify the high-risk group accurately (see Table 2).

Targeted programs have several disadvantages. First, there is the problem of labeling and stigmatization, which is especially troublesome if individuals have been identified as being at high risk when indeed they are not. Second, targeted programs usually involve some sort of screening maneuver which brings with it several challenges. Screening programs can be expensive and they require considerable commitment, both in terms of money and personnel, to maintain them on an ongoing basis. Further, those persons in a population with the highest refusal rates on screening procedures have been found to be the ones at high risk for the disorder or condition in question (Rose, 1985; Rutter, Tizard, & Whitmore, 1970). In addition, the issue of setting the threshold is not only relevant to establishing the presence or absence of disorder (Boyle et al., 1996) but also is a challenge in screening. Changing the threshold, even slightly, can alter the number in the population who are identified as being at high risk, and this in turn will have effects on all psychometric properties of the screen. This

<table>
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<td>Potential of addressing problems early on</td>
<td>Possibilities of labeling and stigmatization</td>
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<td>Potentially efficient</td>
<td>Difficulties with screening</td>
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<td></td>
<td>• cost and commitment</td>
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<td>• uptake least among those at greatest risk</td>
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<td>• boundary problems</td>
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<td>• risk status unstable</td>
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<td>• difficulty of targeting accurately</td>
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<td>Power to predict future disorder usually very weak</td>
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<td>High-risk group contributes many fewer cases than the low-risk group</td>
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<td>Tends to ignore the social context as a focus of intervention</td>
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difficulty can be compounded if the risk status changes from year to year, and repeated screenings are needed, and it emphasizes the advantage of using a stable marker as the indicator of high-risk status.

Lastly, a major challenge is to identify the high-risk group accurately. Figure 1 outlines the psychometric properties of a screen. Clinicians are interested primarily in the positive predictive value. The relevant question is: What is the probability of patients screening positive ending up with the disorder later on, unless an effective intervention is instituted? Policy markers, on the other hand, have an interest not just in the positive predictive value but in the sensitivity as well. In this latter instance, the relevant question is: What proportion of persons who end up with the outcome would have been identified by the screen at an earlier point in time? The answers to these clinician-initiated and policy-maker-initiated questions address the relative importance of false positives and false negatives. As the criterion for the risk indicator is raised, the usual effect is to increase the positive predictive value but decrease the sensitivity (Offord et al., 1998). Persons screening positive on the enriched indicator are likely to have the disorder in the future (positive predictive value), but the screen will identify only a small proportion of the people who end up with the disorder later on (sensitivity). It is important also to keep in mind that the properties of a screen will vary depending on the prevalence of the particular disorder in a population (Bennett, in press). For example, the positive predictive value of a screen will be much higher in a clinical sample (where the prevalence rate of disorder is relatively high) than in

<table>
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<th>Screen</th>
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<th>Absent</th>
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<tr>
<td>+ve</td>
<td>a</td>
<td>b</td>
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<tr>
<td>-ve</td>
<td>c</td>
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Sensitivity = \( \frac{a}{a+c} \)
Specificity = \( \frac{d}{b+d} \)
Positive Predictive Value = \( \frac{a}{a+b} \)
Negative Predictive Value = \( \frac{d}{c+d} \)
Prevalence = \( \frac{a+c}{a+b+c+d} \)
Accuracy = \( \frac{a+d}{a+b+c+d} \)

Fig. 1. Predictive accuracy.
Selection of levels of prevention

A formidable task to identify accurately in a community population individuals for targeted interventions (Bennett, in press; Bennett et al., 1999; Bennett, Lipman, Racine, & Offord, 1998; Lipman et al., 1998). For example, Lipman and colleagues (Lipman et al., 1998), using data from the Ontario Child Health Study (a large, province-wide community sample gathering data on the mental health of children, aged 4 to 16 years of age (Boyle et al., 1987; Offord, Boyle, Szatmari, et al., 1987), noted that of children identified as antisocial at 4 and 5 years of age, a maximum of 50% would still be classified as antisocial four years later, at ages 8 and 9 (i.e., positive predictive value = 50%). Further, of those children who were designated as antisocial at ages 8 and 9, a maximum of 50% would have been identified 4 years earlier as being at risk for antisocial behavior 4 years later (i.e., sensitivity = 50%). Promising approaches of increasing predictive accuracy include taking multiple measures of the predictor and the outcome to increase the reliability of the measures, and second, moving from identifying a predictor at one point in time to continuous risk assessment over time (Heilbrun, 1997; Offord, Lipman, & Duku, in press). This latter strategy has been suggested as a way to improve the prediction of violence in adult psychiatric patients.

A third and related potential disadvantage of targeted programs is that the power to predict future disorder is usually very weak. For example, in the Dunedin Study, a follow-up study of a birth cohort, the accuracy of data at ages 3 and 5 predicting stable and pervasive antisocial behavior at age 11 is not impressive (White, Moffit, Earls, Robins, & Silva, 1990). In this case, the positive predictive value was only 15% while the sensitivity was 64%. Here is an example where the strength of the relationship between the predictor and the outcome was statistically significant, but the results were of no practical importance in terms of using this predictor to identify a high-risk group for a targeted intervention to prevent antisocial behavior at age 11.

A fourth disadvantage of targeted programs is that although the high-risk group can be expected to have a greater proportion of individuals who will eventually qualify for the disorder or condition of interest at follow-up, the vast majority of cases will come from the low-risk group (Rose, 1985). For instance, in the Ontario Child Health Study, the data show that, as expected, children living in families with an annual income under Can $10,000 are at high risk for developing emotion and behavioral disorders; the prevalence rate of disorder in this group is 36.3%. However, only 7.3% of children in Ontario are from families in this income category. Thus this subgroup of economically disadvantaged children contributes only 14.5% to the population of children with psychiatric disorder. On the other hand, children who live in families who are more financially advantaged (annual income of Can $25,000 or more) account for more than half the children with psychiatric disorder. The reason is that although the risk for disorder is much lower in this relatively well-off population of children compared to the economically disadvantaged child population, there are so many more children in the middle- and upper-class group, that their contribution to the population of children with disorder is far greater than that of poor children. A painful implication of this finding is that one targeted program, even if effective, cannot be expected to have a marked effect in reducing the disorder of interest at the population level.

The last two disadvantages of targeted programs have already been discussed as advantages of universal programs. Targeted interventions tend to ignore the social context (e.g., the community) as a focus of intervention, and the interventions may not be behaviorally appropriate (e.g., the entire population has high levels of the behavior that is the focus of the targeted interventions).
THE IMPORTANCE OF A CIVIC COMMUNITY

In a civic community, there is marked civic engagement, active participation in public affairs, and there is trust, solidarity, and tolerance among the citizens (Putnam, 1993a, 1993b). There are strong horizontal ties in the community that ensure that social capital (Coleman, 1988) will be present in large amounts. Civic communities are more likely to set up community activities in the sports (e.g., athletic teams) and the arts (e.g., choral societies). They have what has been termed a high degree of “collective efficacy,” defined as social cohesion among neighbors as well as a willingness to intercede on behalf of the common good (Sampson, Raudenbush, & Earls, 1997). An important end result is that residents in the community take responsibility for more than their own children and adolescents. There is a sense, among adult members of the community, of collective responsibility for young people.

Prevention programs are fragile. An important consideration is identifying the prerequisites that will be necessary for their success. A major prerequisite is a civic community. Prevention programs will have little chance of being effective in a community which is disorganized and uncivic. For example, it is impossible to set up an effective prevention program (universal or targeted) in a family of schools when the schools themselves are disorganized, understaffed and low morale is ubiquitous. The salvation for children and adolescents living in an uncivic community is not universal and targeted intervention programs, but initiatives that will address the uncivinceness itself.

DECIDING ON THE OPTIMAL MIX OF UNIVERSAL, TARGETED AND CLINICAL PROGRAMS

The details of the data that are needed to make informed rational judgements about choosing the best mix of universal, targeted, and clinical programs are beyond the scope of this paper. However, several requirements top the list, and they include: the effectiveness of an intervention (Sackett, 1980; Tugwell, Bennett, & Sackett, 1985), the extent to which the intervention reaches those who need it (Rossi & Freeman, 1993), the rate of compliance or take up of the intervention among those who need it, and the cost of the intervention (Department of Clinical Epidemiology and Biostatistics, McMaster University, Health Sciences Centre, 1984a, 1984b).

With data available on these basic issues, five further steps should be taken in deciding the optimal mix of universal, targeted, and clinical programs (Offord et al., 1998). They include:

1. Determine the annual prevalence of the disorder in the absence of any prevention and determine the annual cost to a child (and his family) with the disorder. This includes the costs of treatment for those who seek treatment, the costs attributable to the consequences of ineffective treatment, and the costs related to the consequences of leaving the disorder untreated.

2. Review what is known about risk factors for a disorder, and distinguish among correlates, concomitants or consequences, and risk factors including fixed markers, variable risk factors and causal risk factors (Kraemer et al., 1997; Offord & Kraemer, in press).

3. Determine what screening procedures are available, and what the sensitivity, positive predictive value, etc., are, as well as the cost per subject. Consideration could be given to a multistage screening procedure. The first-stage screen would be low cost with a very high sensitivity to exclude those subjects very unlikely to get the disorder. The second-stage screen would be administered to those who were posi-
Selection of levels of prevention 841
tive in the first screen. It would be of higher cost with high sensitivity, but with
greater specificity to rule out false positives. Only those positive on the second
screen would be eligible for the targeted prevention program.

4. Review what is known about causal risk or protective factors. Are there such fac-
tors either singly or in combination that can be changed, and if changed, can alter
the risk of disorder?

5. Determine what prevention programs are available, with what cost per subject, and
with what probability of successfully preventing disorder.

CONCLUDING REMARKS

What is needed to reduce the huge burden of suffering from child and adolescent
psychiatric disorders is the optimal combination of universal, targeted, and clinical
programs carried out in the context of a civic community. A major research goal is to
develop sufficient knowledge of the cost-effectiveness of universal, targeted, and clinical
interventions in the child and adolescent mental health field so that the optimal
mix of programs could be chosen on an informed, rational basis.

The eventual strategy to reduce the burden of suffering would consist of a number of
concurrent steps (Offord et al., 1998). First, effective universal programs would be in
place. Targeted programs would follow for those not helped sufficiently by the universal
programs. As mentioned above, the screening for the targeted programs could be done in
stages, and more intensive interventions launched at each stage to the screen-positive
population. Finally, for those unaffected by the targeted programs, clinical services would
be available. Following such a strategy has a number of advantages. First, it addresses a
major need in the field, namely, to reduce the size of the population seeking clinical ser-

dices. Second, there could be multiplier effects where interventions at one level (e.g.,
community policing to reduce drug use) would reinforce those at another (e.g., a targeted
drug prevention program for high-risk adolescents). Third, it strengthens the need to
monitor the level of child and adolescent psychiatric disorders, and related conditions, on
a population basis. Fourth, and last, it reinforces the idea that one-step prevention pro-
grams are as unrealistic as clinical programs alone as a means of reducing the frequency
of child and adolescent psychiatric disorders. An optimal mix of universal, targeted, and
clinical programs is needed, there will always be trade-offs among these, and the ele-
ments of the combination will change as knowledge accumulates.

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