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Searching for similarities: transfer-oriented learning in health education at secondary schools

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Chapter 7

SUMMARY AND GENERAL DISCUSSION

Health-compromizing lifestyles such as smoking, binge drinking, unsafe sex and insufficient intake of fruit and vegetables are widely prevalent among young people. Numerous health education programs have been, and continue to be, developed to promote healthful behaviors among adolescents. The majority of adolescent health promotion programs are designed for use in schools and are often supplementary to the regular school curriculum. Most programs focus on a single health-related behavior. Altogether, these single health education programs may overload the school curriculum and teaching staff. It would be more efficient if a single intervention could produce effects in multiple domains. A transfer-oriented approach may offer possibilities for such an intervention.

This thesis focuses on the feasibility and effectiveness of a transfer-oriented approach to health education in secondary schools. The term transfer refers to a process in which knowledge and skills learned in one context (e.g., a particular health behavior domain) are applied to another context (e.g., a different health behavior domain). If an intervention is to produce effects in several domains at the same time, this presupposes that the knowledge and skills relevant to the various domains have a common core, and that the intervention can be designed in such a way that students can actually carry over the knowledge and skills from one domain to another.

In this thesis, the main research question is:

Is it possible, with a specially designed transfer-oriented intervention about smoking and safe sex, to achieve effects on behavior and determinants not only in the domains of smoking and safe sex, but also in the closely related domain of alcohol and the less closely related domain of healthy nutrition?

The data presented in this thesis suggests the answer to this question is ‘yes, to a large extent’.

The main research question was partitioned into four research questions that were examined in various substudies. In this general discussion, we will first summarize the results of these substudies and the answers to the research questions. Additionally, we will reflect on the strengths and limitations of the studies, followed by

reflections on the potential significance of the results for theory and practice. Lastly, recommendations are made for further research.

1. SUMMARY OF THE PROJECT AND ITS RESULTS

The transfer oriented curriculum we developed and tested focused on two behavioral domains: smoking and safe sex. In the studies, two other behavior domains were examined as transfer domains: alcohol and healthy nutrition. The choice for these four domains was based on two reasons: a) these domains are addressed relatively frequently in health education classes at secondary schools in The Netherlands (Dafesh, 2006), and b) according to available literature at the time we developed our research plan, we expected that the strength of associations between these domains would differ. The latter is relevant from the viewpoint of transfer, as transfer literature indicates that transfer to closely related domains (i.e. alcohol) is easier to produce than transfer to less closely related domains (i.e. nutrition).

Since transfer requires some type of similarity or association between domains, the first phase in the project was to examine similarities and associations between the four domains of smoking, safe sex, alcohol, and healthy nutrition. The first phase was thus preparatory in nature, designed to examine the feasibility of a transfer-oriented approach.

1.1 Phase 1: Examining associations and similarities between domains

Phase 1 comprised two research questions, which are addressed in chapters 2 to 4 of this thesis. Chapters 2 and 3 are relevant for the first research question.

Research question 1: To what extent are the domains of smoking, alcohol abuse, safe sex and healthy nutrition associated at the level of behavior, and which similarities exist between these domains at the level of behavioral determinants?

This research question was examined by means of a literature review. Chapter 2 describes the full review of 116 publications, and goes into the extent to which the domains are associated at the level of behavior, and which determinants are similar across the four domains. Regarding associations at the behavioral level, the review revealed that tobacco and alcohol use are strongly associated, and are also associated with precocious sex. However, behavioral associations involving safe sex and healthy nutrition had hardly been studied and the review results involving these domains were thus not clear.

Regarding similarities between determinants, the review identified several determinants to have a positive, health-promoting influence in all four domains (living in a two-parent family, parental support, and parental monitoring) and one determinant to have a negative, health-compromizing influence in all domains (emotional distress). In addition, the review identified several other determinants that were similar across all domains; these are discussed in chapter 3.

In addition to the determinants indicated above, which were measured in a non-domain-specific way, in chapter 3 we zoomed in on domain-specific determinants,

making use of 87 publications from the above-mentioned review sample that examined such determinants. Domain-specific determinants are determinants which are framed in terms of a particular domain or whose content varies with the domain in question, such as outcome expectancies. Despite their domain-specific content, these determinants may share common ground on a more general level (e.g., regarding the type of outcome expectancies: physical consequences, social consequences, et cetera). This may be relevant for teaching for transfer, since transfer-oriented learning is about discovering and applying general issues in specific factors across domains.

In our review, we identified the following domain-specific determinants to be similar across all four domains: 1) beliefs that the unhealthy behavior will lead to immediate gratification and to social advantages had a negative association with healthy behavior; 2) peer norms, peer and parental modeling behavior and refusal self-efficacy had a positive association with healthy behavior. We considered these determinants to be the most relevant ones to address in our transfer-oriented intervention, for several reasons: a) these determinants show similarity across the behavioral domains of interest, and b) these determinants are frequently addressed in school health education interventions and they can be more easily modified by interventions than the general, non-domain-specific determinants discussed in chapter 2 (living in a two-parent family, etc.)

With regard to chapters 2 and 3, it is worth mentioning that a relatively small number of determinants had been studied in all four domains. This limits the number of determinants for which similarities across all four domains could be found. However, the results for determinants that had been studied in only two or three domains, also indicated that many determinants were similar across several domains. Moreover, in most cases their influence was consistently either health-promoting or health-compromizing across domains.

As part of the preparatory phase of examining the feasibility of a transfer-oriented approach, we believed it to be important that the four domains not only share similar determinants, but also share similar effective intervention methods with which the determinants can best be targeted. Hence, in chapter 4 we addressed the following research question.

Research question 2: Which effective elements of school health promotion are similar across the domains of smoking, alcohol abuse, safe sex and healthy nutrition?

This research question was, again, examined by means of a literature review, a review of 55 reviews to be more precise. Since the number of reviews explicitly focusing on either tobacco or alcohol use was small, and a large number of reviews had a broader focus on substance use, we collapsed the tobacco and alcohol domains into the broader domain of substance abuse. In the review, we focused on the following elements of the educational interventions: goals, process of development, content, methods, facilitator, components, and intensity. Eleven elements were found to be similar across the substance abuse, sexuality, and nutrition domains, but the strength of evidence in all domains differed per element. Five elements had evidence from strong reviews in all domains: use of theory, particularly social-cognitive theory;

addressing social influences, especially social norms; addressing cognitive-behavioral skills; training of facilitators; and multiple components (e.g., school plus community involvement). Somewhat less consistent evidence across domains was found for two additional elements: parent involvement and a larger number of sessions. Lastly, for four additional elements, the results were more speculative, as in one or two domains these elements had only been examined by weak reviews: specific behavioral focus; addressing determinants; interactive methods; knowledge-only approach (this was an ineffective element).

The results of the preparatory phase showed a sufficient degree of similarity or association across the four domains – in terms of behavior, determinants, and effective elements of interventions– for us to conclude that a transfer-oriented approach would be feasible.

1.2 Phase 2: Development of the transfer-oriented curriculum

The next phase in our project was the development of a curriculum about smoking and safe sex, which would specifically aim to promote transfer of learning to other health behavior domains. The development was based on various sources of information and expertise, including the results of the preliminary literature reviews (cf. chapters 2, 3 and 4), existing Dutch evidence-based school programs about smoking and safe sex, various social psychological theories for explaining and changing behavior, evidence and theory from educational psychology about conditions for promoting transfer, and expert and creative input from various professionals who are familiar with designing school health promotion interventions and educational materials for the selected target group of students and teachers.

The target group comprised students and teachers in the second year (Grade 8) of schools which prepare for higher vocational education or university (havo-vwo). The curriculum, by the name of ‘Multiple Choice 4 U’, consisted of a teacher manual, a student book, a video, and a teacher training session. It was designed as a 10-session curriculum and was divided into five chapters. After an introductory chapter (chapter 1, session 1), it focused sequentially on the domains of smoking (chapters 2 and 3, sessions 2-5) and safe sex (chapters 4 and 5, sessions 6-10).

The curriculum focused mainly on three psychosocial constructs: attitudes (short-term physical, social and other consequences, health risks, anticipated regret), social influences (prevalence estimates, social norms, peer pressure) and self-efficacy (risky situations, refusal and negotiation skills, condom use skills). These were addressed both in a domain-specific way for smoking and safe sex and in a general way.

Throughout the curriculum, texts and assignments to stimulate transfer to other health behavior domains were included. The transfer-oriented approach was operationalized mainly by addressing the following transfer-promoting conditions: a) decontextualization, b) recontextualization, c) meaningfulness and d) reflection. This is explained below.

(a) *Decontextualization* means that the learning content is addressed in a general, non-domain-specific way. The transfer message that the curriculum is not only about

smoking and safe sex, but is also relevant for all kinds of health behaviors, was stressed from the first session. Throughout the curriculum, texts and assignments explicitly addressed general cognitive and behavioral skills pertaining to decision-making, problem-solving, refusal and negotiation skills. The general skills are presented in Box 1. The introduction of specific general skills was carefully tuned to domain-specific learning content about smoking and safe sex to which they are relevant. General skills were thus interwoven in a natural way with domain-specific texts and assignments, while color was used to indicate their general nature.

Box 1. General cognitive-behavioral skills in the curriculum

The theme of ‘making choices’ was chosen as the central theme that connected all general skills. It was partitioned into three sub themes, which correspond to the main determinants addressed: making your own choices (attitude), other people’s choices (social influences), and implementing your choices (self-efficacy).

Making your own choices (~attitude)

Behavior can have positive and negative consequences, e.g. for your health. It is wise to correctly know all short- and long-term consequences and think them over; it can help you prevent future regret. People make excuses for behaviors they know are unwise. Decision-making action plan: define the problem or situation; think out possible solutions/actions; consider the pros and cons of each solution; make sure your information is correct and distinguish opinion from fact; think about possible regret; choose the solution that offers you the most pros and the least cons and regret.

Other people’s choices (~social influences)

People can value consequences differently and act differently. Don’t just do what others do: follow your own judgment. Consider that all opinions are justified as long as they don’t conflict with relevant facts. You may not know what people think or do; best ask instead of assume. Other people may try to influence your choices, e.g. help or obstruct you. Think for yourself and determine how much you care about the opinion of others. It takes some confidence to express your opinion.

Implementing your choices (~self-efficacy)

Attaining a certain goal may require knowledge, skill and courage. Practice helps you gain experience, don’t give up on your first attempt. Chunk your goal into little steps, anticipate possible difficulties and try to find solutions. If you anticipate peer pressure, think about what you can do or say (avoid situations, say no, use counterarguments, walk away).

(b) *Recontextualization* means that the learning content is applied to a new context. Throughout the curriculum, so-called ‘excursion assignments’ prompted students to think about if and how the general skills can be applied to other behaviors than smoking and safe sex. In many cases, the excursion assignment elaborated on a prior domain-specific assignment about smoking or safe sex, by asking students to think of examples for other health behaviors. In some cases, the excursion assignment was more extensive and free-standing, e.g. an assignment to draw a cartoon or write a

film scenario portraying how at least one general skill is applied to a health behavior of their choice.

(c) *Personal meaningfulness* of learning was stimulated in a number of ways. Students were given the opportunity to make their own choices in curriculum assignments. For instance, in the cartoon/film scenario assignment students were given the freedom to choose the format (cartoon or scenario), the general skill and the behavior. Also, many assignments asked about students' personal beliefs and examples from their own lives. Moreover, many assignments set out to confront students with real-life dilemma situations, to which they were asked to come up with their own solutions. Discussion and collaboration between students were stimulated as they can lead to co-creation of shared meanings.

(d) *Reflection* on the learning content and its personal relevance was also stimulated in various ways. The 'excursion assignments' can be regarded as reflective assignments. Also, many assignments asked students to first give their personal beliefs or to think of solutions to a posited problem, and then to discuss their beliefs or solutions with other students. Such assignments stimulate reflection in a discussion format. Moreover, each chapter in the student book concluded with some logbook questions, in which students could indicate what they thought of the learning content in terms of usefulness for their life, and unanswered questions they might have.

The lessons were interactive, were mostly conducted in pairs or small groups and used a variety of instructional strategies, including: small and large group discussion, creative assignments, elicitation and modeling of refusal skills on video, condom demonstration and practice, interviewing smokers and non-smokers, self-tests, and searching information on the Internet.

The teacher manual included some background information about transfer-promoting conditions, and mainly consisted of instructions about assignments. Instructions relevant to transfer (e.g., about 'excursion assignments') were color-highlighted to indicate their significance. The teacher training session was minimal and lasted three hours. It focused on information and discussion about the conditions for transfer and about the importance of adhering to critical learning activities and to the study design.

The above-described curriculum was completed after a previous prototype version of the curriculum had been pilot-tested. The pilot-test took place among the original target group selected for the study: students and teachers in preparatory vocational education (vmbo). This target group was originally selected because health-risk behaviors are more prevalent among these students than among students in higher school levels. Six teachers from five schools agreed to implement the full prototype curriculum in eleven Grade 8 classes.

The pilot study was designed to serve several aims: a) to examine teachers' and students' perceptions of attractiveness, practicability and feasibility of the curriculum (formative evaluation), b) to test the psychometric qualities of a draft version of

the student questionnaire later to be used in the effectiveness study, and c) to analyze the results of the baseline and post-test administration of the draft student questionnaire as an indication of pre-to-post changes in student learning outcomes.

The results of the pilot study called for improvements with regard to the attractiveness and practicability of the curriculum and the likelihood to produce transfer. Therefore, the results led to profound modifications to the prototype curriculum. As for the likelihood to produce transfer, decontextualization was addressed in a too implicit way in the prototype and was made more explicit in the final curriculum. Also, reflective and excursion assignments were integrated better into the curriculum and were given a more attractive format; in the prototype they were addressed at the end of a lesson as a paper-and-pencil assignment, and they were sometimes skipped because of time limitations. Teacher comments on their students' cognitive and reflective abilities led us to select a different target group for the effect study: a school level which prepares for at least higher vocational education (havo-vwo). Furthermore, many changes were made to improve attractiveness and practicability of the curriculum.

1.3 Phase 3: Assessment of curriculum effectiveness

In chapter 5 we described the effectiveness study of the transfer-oriented curriculum, which gave us the answer to the third research question.

Research question 3: To what extent is a transfer-oriented curriculum about smoking and safe sex effective in changing behavior and behavioral determinants in the domains of smoking and safe sex, and in the closely related domain of alcohol and the less closely related domains of fruit and breakfast consumption?

This research question was examined in an effectiveness study among 1107 students in grades 7 and 8 of 23 schools which prepare for at least higher vocational education (havo-vwo). In a quasi-experimental design, 33 teachers were assigned to the experimental condition (Exp) – teaching the transfer-oriented curriculum – or to a control condition (Con), which involved teaching their regular lessons about smoking and safe sex. Student data were collected in three waves of self-report questionnaires (baseline, post-test, follow-up). Teachers were instructed to teach the experimental curriculum (Exp) or their regular lessons about smoking and safe sex (Con) between baseline and posttest, and to not teach about alcohol or nutrition in that period. The post-test was administered within 1 month after intervention ending, and the follow-up on average 4 months after intervention ending. Attrition at post-test (12.1%) and follow-up (33.0%) did not differ between conditions.

At each measurement point, the student questionnaire asked about behavior and psychosocial determinants for all five behavioral domains under study (smoking, safe sex, alcohol, fruit, and breakfast). The psychosocial determinants measured were: knowledge (only measured for smoking and safe sex), attitude, outcome expectancies, risk expectancy, anticipated regret, self-efficacy, normative beliefs from parents and friends, and intention. Because of the large number of psychosocial determinants per domain, we also calculated a composite measure of determinants for

each domain by averaging the standardized scores on the psychosocial determinants. This measure included all determinants, except the knowledge measure in the domains of smoking and safe sex, and was used in analysis as a proxy for multivariate testing of effects on psychosocial determinants. Teachers were asked to record the number of lessons on each of the domains.

The analyses of effects were multilevel and controlled for various student factors (among other things demographics and baseline measure). Analyses in the alcohol and nutrition domains also controlled for instruction time on these domains.

In the tobacco domain, analyses of effects revealed a statistically significant positive intervention effect on behavior at post-test and follow-up. At both measurement points, there were significant effects on the composite measure of psychosocial determinants. At the level of individual determinants, significant effects occurred on three factors at post-test (outcome expectancies, anticipated regret, intention) and on four factors at follow-up (outcome expectancies, knowledge, perceived risk and self-efficacy).

Results in the safe sex domain showed that fewer experimental students than controls had recent experience with intercourse at post-test. There were no other effects on sexual behavior items or on the composite measure of determinants, neither at post-test nor follow-up.

As for behavioral effects in the alcohol domain, an effect that approached significance was observed for frequency of consumption at post-test. At follow-up, significant effects were found for both frequency of consumption and binge drinking. At the level of determinants, significant effects on the composite measure of determinants were observed at both measurement points. Regarding individual determinants, significant positive intervention effects were observed for two determinants at post-test (anticipated regret and self-efficacy) and at follow-up (anticipated regret, intention). In addition, various marginally significant intervention effects occurred (on outcome expectancies at post-test, and on social norm and self-efficacy at follow-up).

In the fruit and breakfast domains, no effects on behavior were found at post-test or follow-up. There were significant effects on the composite measure of determinants at both measurement points in both domains. In the fruit domain there were favorable intervention effects on two to three psychosocial predictors at each measurement point: on outcome expectancies and anticipated regret at post-test, and on attitude and self-efficacy at follow-up. Significant effects on individual determinants in the breakfast domain were found for attitude, perceived risk and self-efficacy at post-test, and for attitude, outcome expectancies and self-efficacy at follow-up.

The results for the alcohol and nutrition domains clearly indicate that transfer effects occurred. The effects in the alcohol domain are stronger than those in the nutrition domains, judging from the effects on alcohol behavior and a larger effect size for the composite measure of determinants. This is in line with our expectation that transfer is more likely to occur to domains that are closely related to the taught domain(s) than for domains that are less closely related.

The relative absence of effects in the safe sex domain was surprising. Possibly, the safe sex component of our experimental curriculum was not stronger than the safe sex lessons in the control group. Another explanation may be that the quality of im-

plementation of the safe sex component was lower than that of the tobacco component. Indeed, teachers reported a lower degree of implementation of the safe sex component, mainly because most teachers needed more lessons to complete the total curriculum than the ten lessons that were planned; the mean number of lessons was 14.

Since we observed transfer effects in the domains of alcohol, fruit and breakfast consumption in the effect study, we additionally examined mediation mechanisms which may explain how the transfer effects were produced. This mediation study, addressing research question 4, is reported in chapter 6.

Research question 4: To what extent are transfer effects in the closely related domain of alcohol and in the less closely related domains of fruit and breakfast consumption mediated by students' learning experiences with respect to general cognitive-behavioral skills?

The mediation study was conducted with the data of the effectiveness study. Specifically, it was examined to what extent students at post-test reported learning a general cognitive-behavioral skill, and to what extent these learning experiences mediated the intervention effects in the untaught domains at follow-up.

The post-test student questionnaire included two types of learner report questions ("What have you learned in the lessons?") for measuring learning experiences. One type, the so-called closed learner report (CLR), asked students to choose (to a maximum of four) the most important things they had learned in the lessons from ten pre-determined statements: five statements pertained to a general skill, two were tobacco-specific and three were safe-sex-specific. The variable used in the analyses was the number of general skills chosen by the student (0-4). The second type of learner report, the so-called open learner report (OLR), asked students the same question in an open-ended format, again to a maximum of four. The answers to this question were coded qualitatively as yes-no reflecting a general skill, and then summed. Because of an uneven distribution of scores across the experimental conditions, this variable was later dichotomized (yes-no a general skill mentioned in any of the four student responses). Thus, two variables were examined as hypothesized mediators: the CLR total number of general skills chosen and the OLR dichotomous measure.

A mediation effect is said to occur if three conditions are met: 1) the intervention has a statistically significant effect on the outcome variable, 2) the intervention has a statistically significant effect on the hypothesized mediator, 3) the hypothesized mediator is statistically significantly associated with the outcome variable after controlling for the intervention variable.

The mediation analyses, which controlled for the same covariates as the effect analyses reported above, showed that there was no indication of mediation for the CLR variable. Although intervention effects were observed for various outcome variables in all domains (mediation condition 1), and there was a significant intervention effect on the CLR variable for all these outcome variables (mediation condition 2), none of the outcome variables were significantly related to the CLR variable (mediation condition 3 was not met). For the OLR measure, the results were more

complex, as they depended on the domain and the specific outcome variable. For all outcome variables, mediation condition 2 was met. In the alcohol domain, there were significant intervention effects on seven of the ten outcome variables (mediation condition 1), but there was no indication of mediation, as none of these variables was significantly related to the OLR variable (mediation condition 3 was not met). In the fruit domain, a significant intervention effect was found on the composite measure of determinants and on self-efficacy (mediation condition 1), and the composite measure of determinants also had a significant association with the OLR variable (condition 3), indicating mediation. In the breakfast domain, a significant intervention effect was found on three outcome variables (attitude, outcome expectancies, self-efficacy), and a marginally significant effect on one (composite measure of determinants). Two of these variables (composite measure, outcome expectancies) were also significantly related to the OLR measure, indicating mediation.

These results indicate two major findings. The first is that in this study the OLR variable appeared to be a stronger indicator of personal lessons learned than the CLR variable. The second is that intervention effects in the alcohol versus the nutrition domains appeared to be brought about by different mechanisms. Personal lessons about general cognitive-behavioral skills contributed to changes in at least some nutrition outcomes, whereas intervention effects in the alcohol domain, though more frequent and substantial, appeared to occur in a less cognitively aware and more automatic way. Possibly, the alcohol context is sufficiently similar to the contexts explicitly addressed in the curriculum (smoking and safe sex) for students to apply the newly acquired knowledge and skills to the alcohol domain without consciously generalizing the information first. This explanation fits in well with results of studies of behavioral clustering, which have consistently shown that alcohol use is strongly associated with the behaviors addressed in our curriculum, more so than nutrition behavior.

This explanation may implicate that an intervention, even a domain-specific intervention, may have transfer effects in nearby domains –even though such transfer effects are not strived for-, whereas for effects in farther domains an explicit transfer approach may be required, one that explicitly addresses general skills. More intervention research is needed, both with respect to transfer-oriented as well as domain-specific interventions, to further examine this intriguing implication.

2. STRENGTHS AND LIMITATIONS

2.1 *Strengths of the project and the studies*

A strong point of the project as a whole is its explicit focus on examining transfer in the field of health education, which, to our knowledge, is new to this field. Moreover, it combined contemporary theory and empirical research from the fields of health promotion, social psychology and educational sciences.

The project as a whole, and consequently this thesis, was built up logically and coherently. First, feasibility of a transfer-oriented approach was checked by examining, in a series of systematic reviews, similarities between four selected behavioral domains in terms of behavior, behavioral determinants and effective elements of

interventions. After sufficient similarities were uncovered, a prototype transfer-oriented curriculum was developed, pilot-tested, and revised. Then, the curriculum was tested for effectiveness in a carefully designed controlled experiment. Lastly, as transfer effects were observed in the effect study, we also invested in gaining insight into the mechanisms that might explain the observed transfer effects.

In addition to the coherent, systematic approach that characterized the project as a whole, the individual studies that comprise the project were of high quality. The reviews in chapters 2, 3, and 4 had a systematic methodology and were comprehensive in their scope. As for the empirical studies described in chapters 5 and 6, the research design was well-constructed and the selection of the behavioral domains was based on current theory and empirical data from educational science and school-based health education. Another strong point was that analyses of effects and mediation with respect to the alcohol and nutrition domains controlled for the possible impact of lessons taught about these domains (“time on task”), which otherwise might have biased our attribution of the observed effects to the transfer-oriented curriculum.

2.2 *Limitations of the studies*

All of the chapters in this thesis that describe a particular sub study (chapters 2-6), include a comprehensive paragraph that discusses the potential limitations of the sub study, as well as our efforts to reduce possible bias. We will recapitulate these limitations here.

As for the systematic reviews of determinants discussed in chapters 2 and 3, the most important limitation is that the included studies showed variation in various aspects: type of research (empirical study, review study), research design (cross-sectional, longitudinal), statistical procedures (quantitative multivariate, quantitative univariate, qualitative), criterion behavior (e.g., alcohol abuse versus ever drinking alcohol), and operationalization of determinants. We have tried to give due consideration to this limitation by being aware of these variations in the first place, by including some of these aspects in our analysis (type of research, research design), and by categorizing determinants conservatively to make sure we were not comparing apples to oranges. Further refinement of inclusion criteria and/or analyses would have reduced the number of available studies considerably. Furthermore, we believe that some extent of variation between studies is inevitable, especially if the aim, as in our case, is to focus broadly on four behavioral domains and, within each of these domains, on all types of determinants (proximal, distal, ultimate).

Variation between studies may also have biased the review of effective intervention elements discussed in chapter 4. Here, comparable considerations as above are valid. An additional limitation may be that the review-of-reviews approach we used, relies on ‘second-hand’ information and is vulnerable to potential interpretive or conceptual biases of previous reviewers. We have attempted to limit such biases as much as possible by using a systematic review methodology, by assessing the quality and relevance of each review and relying on reviews of high to moderate quality, by carefully categorizing the results without generalizing too much, and, in case reviews had differential results, by attempting to examine the causes of the differ-

ences. We also attempted to check the results of reviews if sufficient information was provided. We do not believe the results would have been very different if an alternative review methodology was used, especially not with respect to the main finding that there are many similarities in effective intervention elements across domains.

With respect to the effect study discussed in chapter 5, several potential limitations should be mentioned, which also apply to the mediation study in chapter 6. One limitation is that the planned randomized assignment to conditions was only partly implemented with success. This may have led to the baseline differences we observed in demographics and some psychosocial factors, which we therefore controlled for in analyses of effects, and possibly to differences in other factors we did not measure.

Another limitation may be the risk of contamination of experimental conditions, in that in some schools both conditions were represented: experimental and control teachers and students within these schools may have influenced each other. However, we expect this type of bias to be limited, given that this situation only existed in 3 of the 23 participating schools (involving 6 of the 33 teachers).

A third limitation concerns the attrition at follow-up. Attrition had a negative impact on the power of the analyses, which may have affected the follow-up results. The observed attrition did not appear to be selective, as it did not differ between the experimental and control group. Also, dropouts did not differ from students retained to the study on any of the baseline behavioral measures, suggesting that there was no selective attrition of high-risk students.

Unfortunately, controlling for instruction time in analyzing the transfer effects to the alcohol or nutrition domains, led to additional drop-out of teachers and students at post-test and follow-up. This was because some teachers had failed to report their instruction time for these subjects. However, most of the observed effects were also found in analyses that did not control for instruction time.

In the mediation study discussed in chapter 6, additional dropout occurred because of missing values on the learner reports. In this study, total dropout rates differed between the conditions. Also, differences in various baseline scores were observed between dropouts and non-dropouts and between experimental and control students. Therefore, baseline scores were included as covariates in analyses.

The participating teachers were instructed to take ten sessions to complete the curriculum. However, in practice many teachers needed more sessions (the mean number of sessions taught was 14), and teachers who did not have sufficient time available skipped some of the lessons or assignments. Since smoking and safe sex were addressed sequentially in the curriculum, time constraints became more urgent during the sessions on safe sex, and implementation data indicated these sessions were implemented to a lesser extent than sessions about smoking. This might explain the absence of effects in the safe sex domain.

In the domains where effects on determinants were observed – tobacco, alcohol, fruit and breakfast – the effect sizes were small. This is not an uncommon result in school health promotion research (see chapter 4). Furthermore, in the tobacco and alcohol domains, also effects on measures of behavior were found: from baseline to follow-up, experimental students had a smaller increase than control students in cur-

rent smoking, frequency of alcohol consumption, and binge drinking. If the increases are interpreted in terms of reduction in percentages, the reduction was 57% for current smoking and 62% for binge drinking. These reductions are comparable to those reported for Botvin's (2000) Life Skills Training (LST) intervention (40-80%; see chapter 4). In a meta-analysis of various types of psychosocial smoking prevention programs, life skills interventions were found to have the highest effect size of all types of interventions (Hwang et al., 2004; see also chapter 4). Given these results, it is fair to say that our curriculum did quite well with respect to preventing tobacco and alcohol use, especially if one considers that the LST program spans three years and takes far more sessions than ours – 15 in the first year, 10 in the second year, and 5 in the third year.

However, it must be said that our effect study had a limited time span, with follow-up measurement only four months after intervention ending. Given the common finding in school health promotion research that effects tend to erode after some time, and that a one-year interval is generally considered a minimum to speak of 'long-term' results, our study would have been stronger if it had included additional measurements in the following year or years. This effect study was the first to test a transfer approach in health education. In light of its positive results, it is advisable to repeat an effect study of such an approach with a longer-term interval, and it is preferable that the intervention would include a booster to strengthen long-term effects. In the substance use domain, the 3-year LST program has been shown to be effective three years after intervention ending (six years after baseline measurement) (Botvin et al., 1995). Moreover, the LST program has also been shown to have long-term effects on outcomes not addressed in the program: effects on risky driving three years after intervention ending (Griffin et al., 2004) and on HIV risk behavior about ten years after intervention ending (Griffin et al., 2006). Since the content of our curriculum appears to be somewhat related to that of LST, as both address general skills and the effect sizes for substance use are comparable, these LST results may suggest that our curriculum, if extended with boosters in later years, might have chances to produce long-term results in substance use domains and nearby domains.

3. RELEVANCE FOR PRACTICE

Although the transfer-oriented curriculum we have developed and tested was effective to a large extent, it does not appear to be eligible for broad-scale implementation in The Netherlands. This was also not intended in the first place. The curriculum was mainly designed from the perspective of addressing scientific questions about the promotion of transfer in health education. The choice of the behavioral domains it explicitly focuses on – smoking and safe sex –, as well as the choice of the transfer domains alcohol and nutrition, was mainly based on insights into behavioral clustering and related hypotheses about the ease with which transfer could be produced in nearby and farther domains. A barrier to large-scale implementation is that many teachers in our effect study perceived the combination of the domains smoking and safe sex to be odd; a combination of smoking and alcohol would have made more sense in their opinion. Also, student evaluations of the curriculum were somewhat less positive than those of the teaching materials used in the control

group. For the record, most teachers in the control group used regular textbooks in Biology or Care (especially the highly popular textbooks *Biology/Care for You*) for their lessons about smoking and safe sex. These textbooks have been in circulation for years and are updated regularly. In terms of attractiveness and practicability, our newly developed curriculum cannot compete with such institutionalized textbooks. However, in terms of effectiveness, our curriculum shows a surplus value, not only with respect to the taught domain of smoking, but more importantly, also with respect to the promotion of transfer to untaught domains.

A transfer-oriented approach to health education is very relevant to practice, as it may be more efficient than an approach involving multiple single-domain interventions. After all, a transfer-oriented approach may contribute to producing effects in multiple health-behavior domains, while reducing the burden on schools.

A transfer approach fits in well with Dutch national policy in the field of health promotion, as health promotion institutions, which are largely health-domain-specific, are more and more stimulated, or forced, to work together. Health promotion institutions, indeed, seem to be interested in a transfer approach.

The curriculum and the research described in this thesis provide valuable leads for how transfer can be promoted. These leads can be used by curriculum developers to incorporate a transfer-oriented approach into existing or new health education curricula. In our opinion, many current Dutch domain-specific school health promotion interventions, at least the ones developed in university-based research studies, have already incorporated two transfer-promoting conditions to a large extent: reflection and meaningfulness. These interventions already utilize active and interactive teaching methods, address and probe for personal beliefs and experiences, present students with real-life problems to which they are asked to come up with solutions, and stimulate discussion among students. These interventions are designed to stimulate students to transfer the learned knowledge and skills from the classroom setting to the real-life, out-of-school setting where health-related behaviors occur. In our view, the main difference between our curriculum and these domain-specific interventions lies in decontextualization and recontextualization of the content. Whereas some current domain-specific interventions address comparable cognitive-behavioral skills as in our curriculum, they do so in an implicit manner, and solely with respect to their own health behavior domain. In contrast, our curriculum explicitly abstracted the cognitive-behavioral skills, while still grounding them in domain-specific examples for the sake of meaningfulness and comprehension, and stimulated students to apply the general skills to other health behavior domains. Given that most current domain-specific interventions focus on the same behavioral determinants as in our curriculum – knowledge, attitudes, social influences and self-efficacy – and their already implicit use of cognitive-behavioral skills that address these determinants, we believe it would require relatively little effort to integrate the contextualization/recontextualization condition into these domain-specific interventions and thus transform them into a transfer-oriented intervention. A question that remains open is: if one wishes to stimulate transfer to a particular health domain, to what extent is it necessary to include domain-specific content about that domain? To put it differently: if the intervention is to stimulate transfer to a whole range of spe-

cific domains, to what extent does domain-specific content about all these domains have to be integrated into the curriculum, and how could this be organized best?

The minimal scale of the teacher instruction session – three hours - may indicate that a transfer approach does not require much training from teachers in secondary schools, if the instructions in the teacher manual are clear. Classroom observations and teacher interviews in the pilot study, however, indicated that teachers struggled with getting their students to reflect on the learning process and to come up with real-life examples from other domains. This difficulty may also be partly attributed to other factors, especially: to the cognitive and reflective abilities of the students in the pilot study (pre-vocational education), to students' feelings of insecurity in the classroom climate which may inhibit them from sharing personal information about their lives, to the implicit way in which decontextualization was operationalized in the pilot curriculum, and to the not so attractive format of reflective and excursion assignments in the pilot curriculum. These are important considerations for educational practice. We considered the incorporation of reflective, decontextualized and excursion elements in the teaching-learning process as an important condition for transfer-oriented learning. Therefore, in the final curriculum we paid more attention to stimulating feelings of security, and paid extra attention to integrating decontextualization, reflection and excursion assignments into the lessons. Whereas in the pilot curriculum these assignments were mostly placed at the end of each chapter, in the final curriculum they were more interwoven into the lessons, while their special significance for transfer was highlighted by using a background color in the student book. Also, we selected students with a higher school level as the target group for the effect study. This decision was made because we wished to examine the occurrence of transfer under optimal conditions. This does not mean that we believe transfer effects are impossible to attain with students in pre-vocational education. Rather, it means that, in our search for how to operationalize the teaching-learning process in such a way that it promotes transfer, the instructional strategies we designed were deemed to be more suitable for students in a school level that prepares for higher vocational education or university. We believe that promoting transfer among students in pre-vocational education is possible but may require different instructional strategies, for instance assignments of a more practical nature (Volman & Ten Dam, 2000).

4. RELEVANCE FOR THEORY AND RESEARCH

The literature reviews in chapter 2 to 4 of this thesis have provided a comprehensive overview of research into determinants and effective intervention elements in four health-behavior domains: smoking, safe sex, alcohol, and healthy nutrition. The results may be valuable to researchers in each of these domains. Furthermore, the reviews may stimulate researchers in a particular domain to look beyond the boundaries of their own domain to generate research ideas from results in other domains, and may perhaps even stimulate collaborative efforts across domains.

The many similarities and associations we identified across domains, and the positive effects of our transfer-oriented intervention, suggest that such a broad focus may be fruitful.

To our knowledge, our project is the first to explicitly target and examine a transfer approach in the field of health education. To this end, theory and research from health education and social psychology were combined with theory and research from the educational sciences. The effect and mediation studies in chapters 5 and 6 have given insight into the extent of transfer effects in nearby (alcohol) and farther (nutrition) domains, and some insight into the mechanisms by which transfer effects in these domains may occur. These insights may be valuable to advance theorizing, development and implementation of integrative approaches in the field of health promotion and education.

This study was an applied study in its nature, not a conceptual one. However, as an exemplary study of transfer, it might be used by theorists to contribute to a more conceptual discussion in psychology and the educational sciences about definition and operationalization of the notions of near and far transfer. As Barnett and Ceci (2002, p. 619) point out, “defining the terms *near* and *far* is no simple matter, as they are usually based on the intuitive notion of *similarity*, which is itself ill defined”. In a noteworthy effort to further the discussion and shed some conceptual light on the near-far distinction, they have proposed six dimensions of context on which distance between the learning context and the transfer context could be judged. The proposed context dimensions are: knowledge domain; physical context; temporal context; functional context; social context; and modality. Out of interest, we have tried to position our effect study on these dimensions. However, our experience was that some dimensions could be interpreted in different ways, which led to rather different positions on these dimensions. Furthermore, with respect to the context dimension of knowledge domain, Barnett and Ceci (2002) and others (e.g., Marini & Genereux, 1995) posit that the notion of domain itself is ill defined: what constitutes a domain? Indeed, we ourselves have used the term domain in several broader or narrower ways. For instance, in chapter 4, we collapsed the tobacco and alcohol domains into the substance use domain, and in our effect study we divided the nutrition domain into the fruit and breakfast domains. These experiences may indicate the difficulty of conceptualizing and operationalizing the concept of transfer and related concepts, such as ‘domain’. The debate about transfer, and about the extent to which near and far transfer occur, has gone on for over a hundred years (Barnett & Ceci, 2002). Conceptualization and operationalization are needed to further this debate, the identification of transfer-promoting conditions and their application in education.

5. RECOMMENDATIONS FOR FURTHER RESEARCH

Given that an explicit transfer approach in health education has not yet been tested before, there are many avenues for further research.

First of all: in light of the positive results of this study, it is advisable to conduct more effect studies of transfer-oriented approaches in health education. Such effect studies are preferably conducted with a larger range of transfer domains, a longer-term interval, and among various groups of students – for instance, student groups which differ with respect to cognitive abilities, socio-cultural background and extent of domain knowledge.

With respect to our own data, an interesting question for further analysis is to what extent the various observed effects in our effect study are related: do the effects cluster with respect to the type of outcome measure (e.g., are effects on tobacco attitude related to effects on alcohol attitude?) and with respect to the type of domain (are effects in the tobacco domain related or do some students show progress in attitude and others in self-efficacy?). Results of such analyses would probably lead to further hypotheses or speculations about how transfer effects come about.

This study showed that the occurrence or strength of effects in transfer domains may differ according to the relative closeness between the transfer domain and the domain that is explicitly addressed. Future studies may therefore want to incorporate results for behavioral associations in their research design. In recent years, many studies have examined associations between various health behaviors. Although the results so far appear to be reasonably comparable – at least with respect to associations between traditional problem behaviors (e.g. smoking, drug use) which tend to be strong – the specific results of studies may differ. These differences may be attributed to variation across various aspects, such as: the number and nature of behavioral domains examined, the operationalization of behavioral measures, the type of analysis (e.g., bivariate associations versus cluster analysis), and the population under study (e.g., in terms of country, age, sex, ethnicity, socio-economic status). For instance, a recent study showed results for behavioral clustering to differ by age group (Van Nieuwenhuijzen et al., 2009). It would be helpful to have a thorough overview of the literature about behavioral associations for a broad range of health behaviors, preferably also including other behaviors which may be of interest to schools or other institutions (e.g., truancy, academic grades, conduct, bullying). The above-mentioned study aspects should be considered in such an overview.

The results of our mediation study suggest that transfer effects to relatively nearby domains (in our case the alcohol domain) are not mediated by learning experiences with respect to general principles. Possibly, effects in nearby domains might come about in a more automatic way, in that the contexts are sufficiently similar for students to apply what they learned without consciously generalizing the information first. If this is indeed so, it may mean that domain-specific interventions may have ‘unintended’ transfer effects in nearby domains. To examine this, we recommend that effect studies of domain-specific interventions examine such transfer effects in nearby domains. The above-mentioned overview of behavioral associations would be very helpful in identifying and selecting nearby domains. Such effect studies would lead to valuable insights into the breadth or narrowness of effects of domain-specific interventions, and to better or more differentiated views on how transfer to nearby and far domains can be promoted.

In our mediation study, we examined the potential mediating role of ‘learning experiences with respect to general cognitive-behavioral principles’. Indeed, in the fruit and breakfast domains we found some evidence for this mediator. We did not measure ‘knowledge of general principles’, but this may very well be a potential mediator. Recently, Bühler and colleagues (2009) conducted an effect study of a life skills training curriculum (addressing communication, interpersonal relationships, critical thinking, self-awareness, problem solving, coping with stress and emotions) that also focused on substance use. They found evidence for a mediating role of

'knowledge of general life skills' in affecting tobacco use and a critical attitude towards tobacco and alcohol use. Unfortunately, the study did not examine effects in untaught domains, so it cannot clarify the potentially mediating role of life skills knowledge in this respect. This is an interesting issue for further research. In addition to these two factors – learning experiences and life skills knowledge – other factors may be examined as a potential mediator for transfer effects. The factors of meaningfulness and reflection are eligible candidates, as they are thought to be important for producing transfer.

An interesting issue is to what extent domain knowledge is necessary for transfer. The transfer literature indicates that the extent of domain knowledge, or the extent to which the knowledge is organized, may influence transfer (Barnett & Ceci, 2002). In the health promotion field, the importance of domain knowledge is unclear, as correct knowledge is considered to be both a prerequisite for healthy behavior and a minor determinant of health behavior, and the extent or nature of the 'necessary' knowledge is unclear. Our curriculum included one 'excursion assignment' that aimed to promote some knowledge of behaviors other than smoking and safe sex. Students were asked to create a poster that would give examples of health behaviors of their choice and would answer the questions: what is healthy or unhealthy about the behavior? why do people (don't) do it (pros and cons)? how many people do it? Due to constraints of questionnaire length, we were unable to measure knowledge in the transfer domains of alcohol, fruit, and breakfast. This issue remains for further research.

In the section on Relevance for theory and research, we raised the conceptual issue 'what constitutes a domain?'. Here, we go on to raise the more practical issue how to deal with 'domain' when trying to teach health education or to promote transfer in health education. Does it work best to focus on a narrowly defined domain, such as tobacco or alcohol, and try to promote transfer from there to other narrowly defined domains? Or is it possible to focus broadly on something like a 'health domain'? Although this specific question, to our knowledge, has not been examined in research and thus remains open for further research, we believe the first approach works best, for several reasons. Firstly, research on learning and instruction has shown that learning works best in a well-defined context (e.g., Brown et al., 1989). Students have to perceive the 'domain' as meaningful in order for them to be able to relate to it. We believe that students can relate better to a narrowly defined domain than to a broad, vague domain. On the other hand, if students are given options to choose, a broad domain may present the student with more options to choose their own behavior of interest. Secondly, various theories and constructs from social psychology (theory of planned behavior, goal setting, implementation intentions) posit that a particular health behavior or action is predicted better as it is defined more narrowly. Thirdly, systematic reviews in the domains of nutrition and sexuality (see chapter 4) have concluded that programs with a specific behavioral focus (e.g., fruit consumption, condom use) are more effective than programs that discuss general nutritional or sexuality issues.

In this thesis we have postulated that transfer-oriented interventions, if effective, are likely to be more efficient than a series of domain-specific interventions. This is because they may produce effects on multiple domains while needing less instruc-

tion time to produce these effects. Further research is needed to examine efficiency and cost-effectiveness from a health promotion perspective, and to examine aspects of feasibility and relieving the burden on schools from the school perspective.

In addition to the proximal determinants targeted by our curriculum, various distal determinants appear to be relevant to multiple behaviors, such as self-esteem and social competence. Indeed, some integrative programs focus on such determinants. Transfer-oriented interventions could be expanded with such determinants, and it would be worthwhile to examine the surplus value and potentially mediating role of these determinants. As such hypothesized underlying determinants may take more time and effort to modify, however, the intervention may require more sessions and a larger number of years. Here, too, issues of efficiency and cost-effectiveness are relevant.

Finally, the study presented in this thesis has focused on the promotion of transfer by designing the teaching-learning process in a certain way. The transfer literature indicates there are large individual differences in the extent or occurrence of transfer (Barnett & Ceci, 2002). Individual characteristics important for transfer include the level and organization of domain knowledge, cognitive abilities or general intelligence, motivation and self-efficacy to learn and apply knowledge and skills, and perhaps even the 'big five' personality traits of conscientiousness, openness to experience, extraversion, emotional stability, and agreeableness (Barnett & Ceci, 2002; Merriam & Leahy, 2005). Student characteristics are thus important to take into account when examining transfer. While some individual characteristics, such as motivation and self-efficacy, may be enhanced by designing the intervention in a specific way, others, such as intelligence, may be less modifiable but still important for selecting the target group.