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**Challenged by cognition : toward optimal measurement and greater understanding of youth cognition in school refusal and cognitive behavioural therapy outcome**

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# **CHAPTER 1**

## General Introduction

## **Cognition in Youth Psychopathology and Cognitive-Behavioural Therapy**

In the past few decades considerable progress has been made with regard to our understanding of internalizing disorders in youth and of the effectiveness of evidence-based cognitive-behavioural treatments (CBTs) for these disorders (Kendall, 2009). During this progress, a prominent role was given to the cognitive theories of psychopathology. The most influential were Beck and colleagues' cognitive theories of depression (1976) and anxiety (1985) stating that emotional disturbances are associated with and caused by negative cognitions. In line with these theories, a considerable body of research in children and adolescents with depression and anxiety has shown that youth with internalizing disorders report more negative and dysfunctional cognitions than healthy youth (e.g., Abela & Hankin, 2008; Alfano, Beidel, & Turner, 2002; Beck, 2005). Further, negative cognition has been found to be involved in the prediction of depression (e.g., Leitenberg, Yost, & Carroll-Wilson, 1986) and anxiety (e.g., Weems, Berman, Silverman, & Saavedra, 2001) in youth. Consequently, targeting negative cognitions during CBTs for youth with depression (Abela & Hankin, 2008) and with anxiety (Stallard, 2009) became one of the key goals of CBTs for these populations.

Although rapid progress has been made with regard to research on the role of cognition in youth psychopathology and treatment, several important issues have largely remained unresolved. Firstly, in contrast to adult research, Beck et al.'s (1976, 1985) cognitive theories in youth with internalizing disorders have been insufficiently investigated (Alfano et al., 2002; Daleiden & Vasey, 1997). Secondly, although cognitive theories suggest that different dimensions of cognition (e.g., cognitive products vs. cognitive processes) are important in psychopathology, most studies with youth have investigated only one type of cognitive dimension or construct (Alfano et al., 2002; Kendall, 2006; Silverman & DiGiuseppe, 2001). Thirdly, this has resulted in the proliferation of CBTs in youth targeting different types of cognitions without sufficiently understanding cognitive products and cognitive processes in youth (Alfano, et al., 2002). CBT interventions aimed at altering negative cognitions have been driven

by the belief that positive treatment outcomes can best be achieved through changes in negative cognitions (Hofmann, 2008). However, in the field of youth treatment, the empirical evidence for this is lacking. An even more fundamental problem in researching the role of cognition in youth psychopathology and treatment is the absence of empirically-valid measurement of different cognitive constructs (Alfano et al., 2002). Although researchers in the field agreed that these were important issues that needed to be solved, solutions have been impaired by the absence of adequate methods and mixed results from previous research making several of these issues challenging to address. Therefore, the purpose of this dissertation is to highlight and address challenges in the research on the role of cognition in youth psychopathology and in CBTs for youth. Addressing these challenges may influence thinking of theoreticians, researchers and clinicians about proper methods to study youth cognitions, types of cognitions that need to be investigated and targeted during treatments, and research designs in order to learn more about the role of cognitive mechanisms of youth treatments. The dissertation focuses upon seven challenges that are related to three specific themes including: (a) the measurement of youth cognition, including empirically valid measurement of cognitive constructs in youth coming from Beck et al.'s cognitive theory; (b) the conceptual issues of cognitive constructs in youth, including both negative cognitions and positive cognitions, and both cognitive products and cognitive processes; and (c) the mechanisms of CBT, including investigation of cognitive mediators of CBT in youth.

The following sections of this chapter describe the seven challenges associated with the three specific themes. Thereafter, the context for the PhD-project is provided and an overview of the structure of the dissertation is presented.

## **Challenges in the Investigation of Cognition in Youth Psychopathology and Cognitive-Behavioural Therapy**

### *Challenge 1: Absence of Items in the CNCEQ to Assess Negative Cognitive Errors Implicated in Cognitive Theory of Anxiety*

Negative cognitive errors are a type of cognitive processing and involve faulty interpretation of new information (Beck, Rush, Shaw, & Emery, 1979). In 1986, Leitenberg et al. developed the Children's Negative Cognitive Error Questionnaire (CNCEQ) to measure negative cognitive errors in youth. This study stimulated a large body of research investigating the relationships between negative cognitive errors and psychopathology in youth. Negative cognitive errors of 'catastrophizing', 'overgeneralizing', 'personalizing', and 'selective abstraction' were found to be related to both internalizing problems in youth (e.g., Cole, Martin, Peeke, Seroczynski, & Hoffman, 1998; Turner & Cole, 1994; Weems and colleagues, 2001, 2004, 2007) and externalizing problems in youth (Barriga, Landau, Stinson, Liao, & Gibbs, 2000; Leung & Poon, 2001). As will be described in more detail in Challenge 2, the CNCEQ was developed on the basis of Beck and colleague's cognitive theory of depression (1979), and not on the basis of cognitive theory of anxiety (Beck, Emery, & Greenberg, 1985). Although anxiety and depression in youth share common features (e.g., Costello, Mustillo, Erkanli, Keeler, & Angold, 2003), to be able to treat these problems more efficiently, it is important to investigate distinct (cognitive) factors related to these two different problems.

At least two themes have been linked to cognitive processing in anxiety: interpretation of ambiguous information as threatening and underestimation of the ability to cope with a certain situation. The interpretative error type involves being predisposed toward negative or erroneous interpretation of neutral, ambiguous, or potentially threatening stimuli or situations (Weems, Costa, Watts, Taylor, & Cannon, 2007). After being presented with ambiguous situations and asked what was happening in these situations anxious youth interpreted ambiguous situations as dangerous, fearful, and unpleasant more often than their nonanxious counterparts (Barrett, Rapee, Dadds, & Ryan, 1996; Bell-Dollan, 1995; Bögels & Zigterman, 2000; Creswell, Schniering, & Rapee, 2005). Anxious adults have frequently reported dysfunctional cognitions

about their ability to cope with events (Beck et al., 1985). With regard to children and adolescents, it seems that anxious youth are also prone to underestimate their ability to deal with stressful or threatening situations (Bögels & Zigterman, 2000; Weems et al., 2007; Weems & Watts, 2004). A review of the studies on the relation between cognitive biases and anxiety in youth showed that lower estimates of the probability of successfully coping with threatening situations are indeed related to anxiety in young people (Daleiden & Vasey, 1997). To facilitate the measurement of specific features of cognitive processing in youth anxiety, items representative of the two negative cognitive errors were added to the CNCEQ in the study described in Chapter 2; that is, items representative of 'threat conclusion' and items representative of 'underestimation of the ability to cope'. The relationship between negative cognitive errors and youth anxiety were also investigated in that study.

### *Challenge 2: Lacking Empirical Support for the Theoretically-Defined Negative Cognitive Error Categories of the CNCEQ*

Beck, Rush, Shaw, and Emery (1979) distinguished 7 types of cognitive errors in accordance with adult depression: 'arbitrary inference' - drawing a conclusion having contrary or no evidence at all; 'selective abstraction' - conceptualizing an experience on a detail which is taken out of context, ignoring other features; 'overgeneralization' - drawing a conclusion on one or more isolated incidents and applying the concept across the board to related and unrelated situations; 'magnification' and 'minimization' - errors in evaluating the significance or magnitude of an event that are so gross as to constitute a distortion; 'personalization' - proclivity to relate external events to oneself when there is no basis for making such a connection; and absolutistic, 'dichotomous thinking' - tendency to place all experiences in one of two opposite categories. To measure negative cognitive errors in depressive adults, Lefebvre (1981) developed the Cognitive Error Questionnaire (CEQ). The raters in Lefebvre's study observed substantial overlap between Beck and colleagues' (1979) 7 negative cognitive error categories. Therefore, some of the categories were collapsed, resulting in 4 reliable negative cognitive error categories which were consequently included in the CEQ. Leitenberg and colleagues (1986)

modeled the Children's Negative Cognitive Error Questionnaire (CNCEQ) after the CEQ. In line with the CEQ, items measuring 4 negative cognitive errors were included in the CNCEQ: (a) 'catastrophizing' (i.e., anticipating that the outcome of an experience will be catastrophic or misinterpreting an event as a catastrophe), (b) 'overgeneralizing' (i.e., assuming that the outcome of an experience will apply to the same experience or even just slightly similar experiences in the future), (c) 'personalizing' (i.e., taking personal responsibility for negative events or interpreting such events as having a personal meaning), and (d) 'selective abstraction' (i.e., selectively attending to negative aspects of experiences).

Since its initial publication in 1986, the CNCEQ has been cited more than 150 times in the literature. It has been used to assess negative cognitive errors in a wide variety of youth disorders, both of an internalizing character (i.e., anxiety and depression; e.g., Candido, 1988; Stewart et al., 2004; Weems et al., 2001, 2007) and an externalizing character (i.e., aggression, conduct disorder; e.g., Barriga et al. 2000). The CNCEQ has been shown to be sensitive to treatment change (Silverman, et al., 1999), and it has been implemented to investigate mediators and moderators of CBT for youth (Curry et al., 2006; Kolko, Brent, Baugher, Bridge & Birmaher, 2000). Furthermore, it has been translated and used among youth from different ethnicities (Karakaya, et al., 2007; Stewart et al., 2004).

Despite its advantages and its very frequent use, there is very little to no evidence for the factorial validity of the theoretically distinct negative cognitive errors present in the measure. As described in more detail in Chapter 2, three studies using exploratory and confirmatory factor analytic approaches (Cole & Turner, 1993; Messer, Kempton, Van Hasselt, Null, & Bukstein, 1994; Stewart et al., 2004) have attempted to find empirical support for the theoretically proposed categories of negative cognitive errors. Nevertheless, the results from all three studies revealed that the CNCEQ comprised one general negative cognitive error factor with all of the items falling within the one and the same factor. The only study proffering some empirical support for separate cognitive errors is that of Karakaya et al. (2007) with the Turkish version of the CNCEQ. Using exploratory factor analysis, authors found support for the three factors which they labeled 'catastrophizing', 'personalizing', and 'selective

abstraction'. Items associated with the fourth cognitive error in the CNCEQ (i.e., 'overgeneralizing') loaded on the other three components. Several loadings did not approach the minimal level recommended for the PCAs (i.e., .32, Tabachnik & Fidell, 2007), and there was insufficient information provided about the cross-loadings. The fact that until now little to no empirical support is found for the distinct negative cognitive error categories is especially problematic since the CNCEQ has been mostly used to investigate distinct negative cognitive error categories in youth (e.g., Leitenberg et al., 1986; Weems et al., 2001), and since in youth treatment outcome studies cognitive therapy may have been designed and implemented based on the assessment of negative cognitive errors via the CNCEQ (e.g., Kolko et al., 2000; Silverman et al., 1999). In Chapter 2 of this dissertation, it has been proposed that the absence of empirical evidence for the existence of separate cognitive error categories in the CNCEQ is due to the overlap in negative cognitive error categories and the fact that not all items are a clear representation of the errors intended to be measured. The study reported in Chapter 2 involved refinement of the CNCEQ, in order to achieve a measure that includes items which are clear representation of the errors they intend to measure. Subsequently, the factorial validity of the revised measure of negative cognitive errors was investigated using both exploratory and confirmatory factor analytic approaches.

### *Challenge 3: Understanding Cognitive Factors Related to School Refusal*

In Beck and colleagues' cognitive theories (1976; 1985), several dimensions of cognition are distinguished: cognitive products (i.e., automatic thoughts), cognitive processes (i.e., thinking styles, also referred to as cognitive errors or distortions), and cognitive schemata (i.e., core beliefs). According to Beck et al.'s theories, negative automatic thoughts are those cognitions that are closest to the surface of consciousness and are situation-specific (Beck, 1995; Sanders & Wills, 2005). The deeper cognitions that incline a person to interpret a wide range of events in a relatively fixed pattern are named cognitive distortions or errors (Sanders & Wills, 2005). The third dimension of cognition according to Beck and



colleagues (i.e., cognitive schemata) are the most fundamental levels of belief; relatively stable and global ideas a person has about the world, the future, and oneself. Besides acknowledgement of the existence of different dimensions of cognition, several theorists have recognized that these dimensions may be hierarchically layered, and have attempted to explain the relations between the different dimensions (Beck, 1995; Beck, Rush, Shaw, & Emery, 1979; Daleiden & Vasey, 1997; Friedberg & McClure, 2002; Merrell, 2001). According to these theorists, incoming information may be via automatic thoughts transformed to distorted cognitive processing and the distortions transform the information further so that the schemata remain intact. Schemata, on the other hand influence the development of distorted cognitive processing, and drive cognitive products and processes. Cognitive processing may be directly responsible for cognitive products, either by facilitating the development of distorted automatic thoughts or by maintaining the specific products a person might have. For example, believing that one is not likeable (schemata), may lead to misinterpreting the reactions of others (processing), and to the automatic thought: "They are not interested in me" (Curry & Wells, 2005; Friedberg & McClure, 2002; Merrell, 2001). During cognitive-behavioural interventions for youth efforts are made to modify all three dimensions of cognition (Alfano et al., 2002; Zarb, 1990, 1992).

Different dimensions of cognition have been tested in relation to youth psychopathology. A series of studies by Schniering, Rapee, and colleagues (2002, 2004a, 2004b) investigated negative automatic thoughts in anxious, depressive and aggressive youth. Further, Leitenberg et al. (1986) investigated negative cognitive errors in relation to depression and anxiety in youth, and Weems et al. (2001, 2007) investigated errors in relation to youth anxiety. Little has been done with respect to the measurement of cognitive schemata in youth. Understanding more of these cognitive dimensions in anxious and depressive youth would have important implications for treatment.

With regard to school refusal, there is still more that needs to be known about cognitive factors associated with this problem area. This is important, since cognitive therapy has been indicated and implemented as one of the key components of treatment for school refusal (Heyne & Rollings, 2002). One cognitive factor which has received some attention

in school refusal research and clinical practice is self-efficacy (Heyne et al., 1998). Self-efficacy has been defined as a person's beliefs about their ability to perform well in certain situations (Bandura, 1994). School-refusing youth have been found to have low expectations about their ability to cope with social and emotional problems and other stressful situations associated with school attendance (e.g., "I won't be able to answer classmates' questions about why I've been away from school for so long."; Heyne et al., 1998; Place, Hulsmeier, Davis, & Taylor, 2000, 2002). Most information regarding other types of cognitions in school refusal comes from clinical experience (Heyne, 2006; Heyne & Rollings, 2002), case studies (Mansdorf & Lukens, 1987; Place et al., 2000), and studies with small samples (n=17) using no comparison group of youth who do not refuse school (Place, et al., 2002). The research field for other internalizing problems has moved towards considering the role of cognitive risk factors in the prediction, mediation and moderation of psychopathology in youth and its treatment. The field of school refusal clearly lies behind these developments. Currently, there is considerable knowledge about non-cognitive factors involved in school refusal such as individual (e.g., age), familial, and school context related factors, but very little is known about cognitive factors associated with school refusal. In an effort to help understand potential cognitive risk factors of school refusal and help improve treatment effectiveness for school-refusing youth, it is important to investigate cognitions in this group of youth. This was the focus of the study reported in Chapter 3 of this dissertation. Cognitive constructs closely linked to Beck et al.'s cognitive theories of depression (1979) and anxiety (1985) were investigated in youth with and without school refusal. These cognitions were negative automatic thoughts and negative cognitive errors.

### *Challenge 4: Determining the Role of Positive Cognitions in School Refusal*

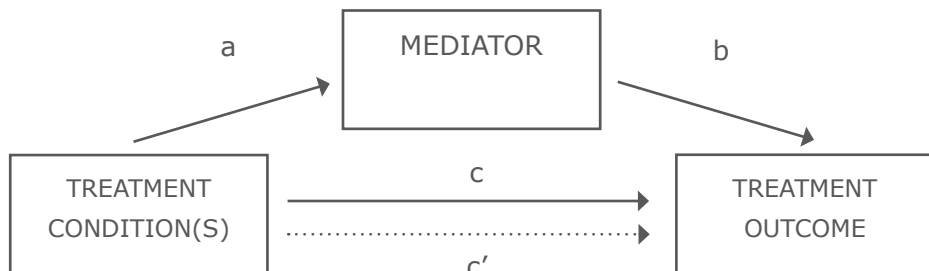
Theoretically, there is still a lot of uncertainty about the role of positive thinking in the development of psychopathology (Boelen, van den Bout, & van der Ploeg, 2002). Kendall proposes that the presence of negative thoughts is more important in the development and persistence of emotional disorders than the absence of positive thoughts (Kendall & Chansky, 1991; Kendall & Korgeski, 1979). In contrast, other authors argue that deficits in positive cognition may constitute an aspect of emotional disorders that is as important as the presence of excessive negative cognition (e.g., Ingram, Kendall, Siegle, Guarino, & McLaughlin, 1995). The research to date has provided support for both perspectives. Positive self-statements (Treadwell & Kendall, 1996) and positive coping statements (Prins & Hanewald, 1997) have not been found to be related to youth anxiety. Regarding the second perspective, Candido (1988) found that higher levels of depression in children were related to lower levels of positive cognition and lower levels of depression were related to higher levels of positive cognition. Kendall, Howard, and Hays (1989), and Henriques and Leitenberg (2002) found similar results among depressed university students. Despite that some research has been conducted in the area of positive cognitions in youth, the research is still very scarce. Further, given the discrepancies across the theories and research results until now, and given the fact that teaching positive self-talk is a central component of cognitive interventions (Weems & Watts, 2004), further consideration must be given to the role of positive cognitions in youth psychopathology. In the study reported in Chapter 3, attention was also given to the role of positive thoughts in school refusal, alongside investigation of negative cognitive products and processes in school refusal.

### *Challenge 5: Identifying Constructs to Be Studied as Potential Mediators of CBT Outcomes*

It has been proposed that the real challenge in psychotherapy research is not to identify evidence-based treatments, but to identify evidence-based explanations of the treatments (i.e., why treatments work; Doss & Atkins,

2006). Indeed, one important area which is increasingly emphasized with respect to improving cognitive-behavioural interventions for youth with internalizing disorders is the investigation of mediators of treatment outcome (e.g., Holmbeck, 1997; Hudson, 2005; Kazdin & Nock, 2003; Prins & Ollendick, 2003; Weersing & Weisz, 2002b). Treatment mediators are “mechanisms or process variables through which a treatment might achieve its effects” (Kraemer, Wilson, Fairburn, & Agras, 2002, p. 878). These variables explain *how* or *why* the treatment achieves its effects: that is, how does CBT reduce anxiety or lead to decreased levels of depression? A graphic representation of the role that mediators are likely to play in CBT for internalizing disorders is presented in Figure 1.1. Investigation of the moderators of treatment outcome helps to answer a different type of question; that is, *for whom* is treatment effective, and *for whom* is it less effective? It is important to distinguish between treatment mediators and treatment moderators (Holmbeck, 1997; Kraemer et al., 2002). Treatment moderators are “pretreatment or baseline variables that identify subgroups of patients within the population who have different effect sizes” (Kraemer, Frank, & Kupfer, 2007, p. 1286).

For many reasons, investigation of treatment mediators is crucial to the field of CBT for internalizing disorders in youth. Identifying the mediators of CBT outcome is central to the identification of effective treatment (components), and to the improvements of existing treatments. The treatment structure can be enhanced, larger effect sizes and more informed dissemination of effective treatment components in the practice can be obtained (Kazdin & Nock, 2003; Kraemer et al., 2002). Through investigation of treatment mediators, enhancement of the understanding of clinical disorders can also be achieved (Kraemer et al., 2002), and developmental psychopathology theories can be confirmed or adapted (Rose, Holmbeck, Coakley, & Franks, 2004).



**Figure 1.1.**

A single mediation model exemplifying mediation of treatment outcome

Despite many calls in the literature for the investigation of mediators of treatment outcome in youth, only a few studies have undertaken this task. In a review by Weersing and Weisz's (2002b) only two studies examined mediators of treatment outcome, one in anxious youth (Treadwell & Kendall, 1996) and one in depressed youth (Kolko et al., 2000). As can be seen in Table 1.1, only one more study has been reported in the time since then (i.e., Kaufman, Rohde, Seeley, Clarke, & Stice, 2005). The paucity of research into mediation of treatment outcome can be accounted for by many factors, including the conceptual challenges (Holmbeck, 1997; Kraemer et al., 2002, 2007; Weersing & Weisz, 2002b). One of the conceptual challenges associated with the study of mediation of treatment outcome involves the choice of mediators to be studied. Kraemer et al. (2002) proposed that a mediating study can be designed to be a hypothesis-generating study or a hypothesis-testing study. In the first case, the researcher does not have sufficient evidence to assume that a certain construct can be a mediator of treatment outcome, or previous research has revealed mixed results regarding the potential mediating role of the construct. Therefore, the researcher can decide to investigate several constructs in an exploratory manner. Due to organizational (e.g., staff to conduct multiple assessments), practical (e.g., multiple assessment can be a burden for the young client), and treatment-related (e.g., multiple assessment can be a threat to the therapeutic alliance) issues it can be advantageous to make a well-considered a priori decision on which potential treatment mediators to include. This would be the case of, what Kraemer et al. named, the hypothesis-testing study. In

this case, theory upon which a treatment in question is based on and the results from previous research need to be taken into account. Some authors (e.g., Kraemer et al., 2002) also provide statistical guidelines that help to determine mediators to be tested. The study reported in Chapter 4 exemplifies the process associated with determining which mediating variable to include in mediation analyses of the outcome of CBT for school refusal.

**Table 1.1**  
Mediators of CBT for Youth with Internalizing Disorders

Study	Target group	Treatment	Sample size at the beginning of the study	Design of the mediational aspect of the study	Mediators under investigation	Results of the mediational analyses	Statistical Method
Treadwell & Kendall	1996 Anxiety	CBT (Coping Cat) vs. wait list	N total = 71	Pre- to posttreatment	Negative and positive self-statements	Changes in negative self-statements mediated CBT effects on anxious symptoms	Baron & Kenny (1986)
Kolko, et al.	2000 Depression	CBT vs. Systemic behavioral family (SBFT) therapy vs. non-directive support therapy (NST)	N total = 107	Pre-, end of acute t/m phase, 24-month follow-up	Cognitive distortions Hopelessness Family dysfunction	No measures mediated effects of CBT on outcome	Baron & Kenny (1986)
Kaufman et al.	2005 Depression	Group CBT vs. Life skills (LS) control condition	N (CBT) = 45 N (LS) = 48	Pre- to posttreatment	Negative cognitions Effective use of relaxation skills Effective use of social skills Frequency of engagement in pleasant activities Effective use of problem-solving techniques Therapeutic alliance Group cohesion	Changes in negative cognitions mediated CBT effects on depressive symptoms	Baron & Kenny (1986)

## *Challenge 6: Determining Mediator Assessment Points for Investigating the Temporal Precedence Requirement*

When establishing mediation of treatment outcome, one wants to know whether treatment affects the mediator and whether these changes in the mediator lead to changes in treatment outcome (Kraemer et al., 2002; MacKinnon, 2008). This sequence of events involves an aspect of temporality. That is, to establish mediation, changes in the mediating variable should precede changes in the treatment outcome (Kraemer et al., 2002; MacKinnon, 2008). To investigate this hypothesis, three aspects of a mediation study should be met: (1) the study design should incorporate more than two assessment points; (2) measures of all variables (mediators and treatment outcomes) should be taken at all assessment points; and (3) assessment should be conducted at the moments when changes in the mediator are expected to cause changes in the treatment outcome. The first two aspects are more practical involving some issues that need to be resolved with regard to, for example, time (e.g., how many assessment points), and cost constraints (e.g., researcher time associated with the assessment). The third aspect is probably the most challenging one to address as hypotheses need to be made with regard to the assessment points (during and after the treatment) at which the mediator will change and at which these changes will lead to changes in the treatment outcome. CBT studies for youth with internalizing disorders (Treadwell & Kendall, 1996; Kaufman, et al., 2005) have generally failed to address aspect (1), that is, to incorporate more than two assessment points in the design of the mediational aspect of the study (see Table 1.1). Therefore, in these studies, it was not possible to test the temporal precedence requirement of mediation. One of the studies (Kolko et al., 2000) indeed included three assessment points. In this study, Kolko et al. used Baron and Kenny's (1986) method to test for mediation. This method proposes that four conditions need to be met when investigating mediation of treatment outcome (the four conditions are in more details explained in the description of Challenge 7). The first condition of Baron and Kenny method is that the treatment needs to affect the treatment outcome. As Kolko et al. did not find significant evidence for this first condition of mediation in their study, they concluded that the hypothesized mediators



(e.g., negative cognitive errors) were not mediators of CBT outcomes for youth depression. The authors thus did not conduct analyses which made use of the data from three assessment points.

The study reported in Chapter 4 of this dissertation addresses the challenge associated with temporal precedence by including three assessment points of the mediator and treatment outcome variables, and testing whether changes in the potential mediator temporally precede and cause changes in the treatment outcome variables.

### *Challenge 7: Choosing a Statistical Approach to Study Mediators of CBT Outcomes*

Statistical challenges (e.g., sample size, statistical method) have been identified as one of the most important obstacles to the study of mediation of youth psychotherapy outcomes (Holmbeck, 1997; Kraemer et al., 2002, 2007; Weersing & Weisz, 2002b). Most researchers are familiar with one of the most widely cited articles in the social sciences by Baron and Kenny (1986) which presented an important statistical approach for the investigation of mediation. It is the most common approach to studying mediation in the psychological literature in general, and in the youth CBT outcome studies for internalizing disorders in particular (Table 1.1). In line with this approach, four conditions need to be met when investigating the mediation of treatment outcome: (1) Treatment needs to effect the treatment outcome (path *c* in Figure 1.1., full line), (2) Treatment condition should predict changes in the mediator (path *a* in Figure 1.1), (3) Change in the mediator should be significantly associated with change in the treatment outcome (path *b* in Figure 1.1.), and (4) When change in the mediator is statistically controlled for, the effect of treatment on change in treatment outcome is attenuated (path *c'* in Figure 1.1., dashed line<sup>1</sup>). According to the Baron and Kenny approach, each of the four steps must be true for mediation to be present.

In a recent simulation study, MacKinnon, Lockwood, Hoffman,

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1 Of course this line can also be a 'full line' if there is complete mediation; that is, if all the change in the treatment outcome caused by the treatment happens via the mediator. In treatment studies this should less often be the case because of the potential multiple mediators (process variables) taking place before, during, and after the treatment.

West, and Sheets (2002) compared several approaches to statistical mediation. Their results suggested that the Baron and Kenny method has inappropriate Type I error rates and a very low power, unless the effect or sample size is large. MacKinnon et al. further found that the most important conditions for mediation are that the 'a' coefficient is statistically significant [condition (2), Baron & Kenny approach] and that the 'b' coefficient [condition (3), Baron & Kenny approach] is statistically significant, based on Type 1 error rates and statistical power. As a result, only conditions (2) and (3) are required to establish mediation. In this so-called product of coefficient test, the product of coefficients from the independent variable to the mediator (*a* path in Figure 1.1.) and the coefficient from the mediator to the dependant variable adjusted for the independent variable, (*b* path in Figure 1.1.) is divided by the standard error of the product to create a test statistic. This test statistic is then compared against a normal distribution to test for significance. The uses of conditions (1) and (4) of the Baron and Kenny method may still be of help with regard to the interpretation of the mediating effect; whether the mediation is partial or total, for example.

Another approach to investigation of mediators of treatment outcomes deserves attention in the context of this section. The conceptual basis for the MacArthur approach to mediation is the same as in the Baron and Kenny's approach, but the operational framework of this approach differs in several ways from Baron and Kenny's analytic approach. For example, in the MacArthur approach to mediation (Kraemer et al., 2002) the focus is on the demonstration of temporal precedence which is required to establish mediation (i.e., mediator occurs during the treatment as a consequence of treatment, and prior to treatment outcome), and a mediator must be correlated to the treatment (Kraemer et al., 2002). Thus, in the MacArthur approach there is a strict requirement of measuring a mediator before the treatment outcome. There are some conceptual difficulties associated with this. If a mediator must occur prior to treatment outcome, then mediators in cross-sectional models and in half-longitudinal 'contemporaneous' models (Cole & Maxwell, 2003) could not be investigated. Despite some limitations, the MacArthur approach has provided important guidelines for the study of mediators in randomized treatment outcomes studies.

The choice for a certain statistical approach for studying mediation can also be related to the opportunity of including a control condition when studying efficacy of CBT. Ethical or organizational considerations can often be the reason why simple random assignment to a waitlist control condition is not feasible. Investigating mediators of CBT outcomes in the case when there is a control condition such as (e.g., waitlist control; psychological placebo control) facilitates interpretation of the mediating results. Studying mediators under these conditions provides better grounds for the conclusion that changes in the mediator and changes in the treatment outcome variables can be accounted for by the CBT (components). In the case of a single condition design there is the uncertainty that the effects during and after the treatment are not accountable to the treatment per se but to other factors. There are studies that examine the efficacy of CBT for youth anxiety (e.g., Bögels & Siqueland, 2006) and mediation of behavioural treatment for childhood social phobia (e.g., Alfano et al., 2009) in the absence of a control condition. Both Baron and Kenny (1986) guidelines and the Kraemer et al. (2002) guidelines for testing mediation have important limitations when applied to studies without no-treatment control groups because of their reliance on between-treatment differences. MacKinnon (2008) describes methods for designs without a control group.

Another issue when choosing the statistical method to study mediation, concerns the sample size. As mentioned above, the Baron and Kenny approach has low power unless the sample size is very large. The results from the simulation study of MacKinnon et al. (2002) showed that as the effect of the direct  $c$  path (CBT-> outcomes) decreased, the Baron and Kenny method required a larger sample sizes, going up to 20,886 participants for a complete mediation model ( $c=0$ ), when effects of  $a$  and  $b$  paths are small, and for the power of .8 to be achieved. On the other hand, the product of coefficients test and asymmetric confidence limits method (MacKinnon, 2008) needed 509 participants under the same conditions. When  $a$  and  $b$  paths are large, the later method (MacKinnon, 2008) would require 33 participants to find a mediating effect with .8 power, while the Baron and Kenny method would need 92 participants to find the same mediating effect. These findings are especially relevant for youth psychotherapy research since small samples are not a rarity. For example, Siqueland, Rynn, and Diamond (2005) investigated the feasibility,

acceptability and efficacy of CBT and attachment based family therapy in a sample of 11 adolescents with anxiety, and Bögels and Siqueland (2006) investigated the efficacy of family CBT in a sample of 17 children and adolescents with anxiety, and their families. The studies on mediation of CBT outcomes as presented in Table 1.1 also show that approximately 30 to 40 participants were included per treatment condition, which is way below the number of participants needed to implement the Baron and Kenny method (MacKinnon, et al., 2002).

As can be further seen in Table 1.1, each of the studies used the Baron and Kenny approach to studying mediation. This may be due to the fact that alternative methods were non-existent at that time, or unknown to the authors, or that there were difficulties with choosing and utilizing other methods. The study presented in Chapter 4 investigated adolescent self-efficacy as a mediator of CBT outcomes for school refusal in a relatively small sample (i.e.,  $n=19$ ) and in the absence of a control condition. To gain as much knowledge as possible about the role of adolescent self-efficacy in the mediation of CBT for school refusal, half-longitudinal as well as full-longitudinal models (Cole & Maxwell, 2003) were tested. Given its advantages above other methods, the method of product of coefficient test and asymmetric confidence intervals was implemented (MacKinnon et al., 2002; MacKinnon, 2008), adapted for single condition designs.

## The Context of the PhD-project

To address the seven challenges, three studies were conducted in the context of the '@school project', the evaluation of a developmentally appropriate CBT for anxiety-based school refusal in adolescence. School refusal is a school attendance problem commonly associated with social-emotional problems such as anxiety and fear (Heyne & King, 2004), somatic symptoms (Bernstein et al., 1997), low self-efficacy (Kearney, 2001), and depression (Heyne et al., 2002). School refusal occurs in around 2% of the population and affects 5% to 16% of clinic-referred youth (King, Ollendick, & Tonge, 1995), with higher prevalence among adolescents relative to children (MacShane, Walter, & Ray, 2001). It causes significant distress for a young person, their family and school

staff, and jeopardizes the young person's social, emotional, academic and vocational development, increasing the risk for psychiatric disorders in adulthood (Berg, 2002; Flakierska-Praquin, Lindstrom, & Gillberg, 1997). The development of the '@school project' was motivated by the need to strengthen interventions for anxiety-based school refusal, in particular interventions for school refusal in adolescence. The '@school project' was a collaboration established between Developmental Psychology (Leiden University) and the Academic Centre for Child and Adolescent Psychiatry (Curium-LUMC, Leiden University Medical Centre).

## **Dissertation Outline**

This introductory chapter has outlined seven challenges associated with the study of cognition in youth psychopathology and psychotherapy. Chapter 2 reports on a study in which the first two challenges were addressed: challenge 1 (*Absence of Items in the CNCEQ to Assess Negative Cognitive Errors Implicated in Cognitive Theory of Anxiety*) and challenge 2 (*Lacking Empirical Support for the Theoretically-Defined Negative Cognitive Error Categories of the CNCEQ*). The study reported in Chapter 3 addressed the third and fourth challenges described above: challenge 3 (*Understanding Cognitive Factors Related to School Refusal*) and challenge 4 (*Determining the Role of Positive Cognitions in School Refusal*). The study reported in Chapter 4 addresses the remaining three challenges: challenge 5 (*Identifying Constructs to Be Studied as Potential Mediators of CBT Outcomes*), challenge 6 (*Determining Mediator Assessment Points for Investigating the Temporal Precedence Requirement*), and challenge 7 (*Choosing a Statistical Approach to Study Mediators of CBT Outcomes*). The dissertation concludes with a summary of the results from the three studies, in light of the seven challenges addressed by these studies. Recommendations are made to address continued challenges in the assessment and investigation of cognitive factors of school refusal and related internalizing problems. Further, directions regarding the study of mediators and moderators of treatment outcomes are provided.

