

University of Groningen

## Anger in youth with anxiety

Kreuze, Leonie

DOI:  
[10.33612/diss.174537019](https://doi.org/10.33612/diss.174537019)

**IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.**

*Document Version*  
Publisher's PDF, also known as Version of record

*Publication date:*  
2021

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*  
Kreuze, L. (2021). *Anger in youth with anxiety: Relationship with reinforcement sensitivity, parental rejection and treatment outcome*. University of Groningen. <https://doi.org/10.33612/diss.174537019>

### Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

### Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

*Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.*



# Chapter 1

---

## General Introduction

*Imagine you have a daughter of 15 years old. She worries a lot about what others may think of her. She often seems shy and does not dare to talk with new classmates, and does not want to go to family birthdays. She can also become very angry. She yells and shouts at you and slams the door. Such an angry outburst also happened yesterday after she had a tennis trial lesson and you wanted her to sign up for the tennis course. It seems as if she has two faces. How would you respond as a parent? How does your response influence your daughter's emotions? What kind of situations trigger her anxiety and her anger? May looking at temperamental characteristics of your daughter help in explaining your daughter's emotions?*

The above text describes the difficulties of a parent taking care of a child suffering from an anxiety disorder with comorbid behavioral problems and brings up some questions that will be addressed in this dissertation.

## **Anxiety and comorbid behavioral problems**

Anxiety disorders are among the most frequent mental health problems experienced by children and young people (CYP), affecting around 6.5% of CYP worldwide (Polanczyk, Salum, Sugaya, Caye, & Rohde, 2015). Anxiety disorders are characterized by extreme distress and worry, and may be generalized or result from specific triggers, such as social situations, separations from an adult, or specific objects and situations (American Psychiatric Association, 2013). Strikingly, and in apparent conflict with the stereotypical expression of internalizing disorders, research shows that 20-30% of anxiety-disordered CYP also suffers from comorbid behavioral disorders, with even a larger proportion of these children displaying subclinical symptoms of behavioral disorders (Cunningham & Ollendick, 2010; Johnco, Salloum, Lewin, McBride, & Storch, 2015). Findings from a large population cohort of adolescents ( $N = 1584$ ) showed a hazard ratio of 2 for having any externalizing disorder (oppositional defiant disorder (ODD), conduct disorder (CD) or attention deficit hyperactivity disorder (ADHD)) when having any anxiety disorder (Ormel et al., 2015). Additionally, other population cohort studies found that the comorbidity of anxiety and behavioral problems (as reflected in the presence of a conduct disorder) was more frequent than expected by chance (findings ranged from three to fourteen times more likely than predicted by chance; Esser, Schmidt, & Woerner, 1990,  $N = 1486$ ; Graham, 2009,  $N = 2303$ ; Laucht, 1987,  $N = 1486$ ; Vikan, 1985,  $N = 1510$ ).

Behavioral problems are characterized as negativistic, oppositional, angry, and hostile behaviors. When these behaviors are frequently displayed, cause significant interference in daily life, and are lasting at least 6 months, the behavior fits under the diagnostic category of Oppositional Defiant Disorder (ODD; American Psychiatric Association, 2013). In its more

extreme form, these behavioral problems can include patterns of behavior in which the basic rights of others or age-appropriate societal norms are violated, labeled as Conduct Disorder (CD, American Psychiatric Association, 2013). In some measures and definitions of behavioral problems, also symptoms of attention deficit hyperactivity disorder (ADHD) are included, measuring inattention, hyperactivity, and impulsivity. In the current dissertation, our focus is on subclinical and clinical levels of behavioral problems as described by oppositional defiant disorder and its more extreme form conduct disorder (and thus not on behavioral problems associated with ADHD).

These CYP with anxiety disorders and comorbid behavioral problems present with greater impairment in daily life, as indicated by poorer levels of psychosocial functioning, less involvement in extracurricular activities, poorer academic functioning, higher caregiver distress, and parent-child relationship problems (Cunningham, Ollendick, & Peugh, 2013; Franco, Saavedra, & Silverman, 2007; Newcorn et al., 2004; Yoo, Joan, Brown, Pamela, & Luthar, Suniya, 2012). Importantly, these CYP with comorbidity seem to have an increased risk for continued mental health problems in adulthood, including a heightened risk for substance misuse, repeated admission to inpatient services, and school failure (Kendall, Safford, Flannery-Schroeder, & Webb, 2004; Ollendick & King, 1994). In all, there are high costs associated with this comorbid profile, both at the individual and at the societal level.

When comorbidity is examined as a predictor of treatment outcome following anxiety-focused cognitive behavioral therapy (CBT), results are mixed. Some studies found a similar treatment response in anxious CYP without comorbidity and those with comorbid disorders including comorbid behavioral problems (Compton et al., 2014  $N = 488$ , age = 7-17; Kendall, Brady, & Verduin, 2001,  $N = 173$ , age = 8-13; Kendall et al., 1997,  $N = 94$ , age = 9-13; Rapee et al., 2003,  $N = 165$ , age = 7-16; Thirlwall, Cooper, & Creswell, 2017,  $N = 125$ , age = 7-12; Wergeland et al., 2016,  $N = 181$ , age = 8-15). Others have found worse treatment response and/or lower remission rates amongst those with comorbid disorders, including comorbid behavioral disorders, in comparison to those without (Hudson et al., 2013,  $N = 395$ , age 6-13; Liber et al., 2010,  $N = 124$  age = 8-12; Rapee et al., 2013,  $N = 750$ , age = 6-18), also at follow-up (Ginsburg et al., 2014,  $N = 288$ , age = 17-26; Kendall et al., 2004,  $N = 86$ , age = 15-22). In a large sample of CYP with anxiety disorders ( $N = 750$ , age = 6-18), it was found that comorbid behavioral disorders did not affect the rate of improvement during treatment, however, those with comorbid behavioral disorders tended to have more severe anxiety symptoms to begin with, and as such, did not reach an equivalent endpoint after treatment (Rapee et al., 2013). In a large sample of 384 CYP it was also found that CYP with comorbid behavioral problems benefited less from anxiety-focused CBT (Hudson et al., 2013). In this study, it seemed that CYP with comorbidity also had a smaller improvement rate than CYP without comorbid behavioral

problems, given that after statistically controlling for pretreatment anxiety severity, CYP with comorbid behavioral problems still had significantly worse end points following treatment than CYP without these comorbid problems.

To date, little is known about the course of behavioral problems during an anxiety-focused treatment. Such anxiety-focused treatments may have beneficial effects on broader outcomes, or the effects may be limited to anxiety symptomatology. Fortunately, studies have started to systematically evaluate the broader effects of anxiety-focused CBT on secondary outcomes. A meta-analysis found reductions on depressive symptoms of a moderate effect size following anxiety focused CBT (Ishikawa, Okajima, Matsuoka, & Sakano (2007). Whether anxiety focused CBT also leads to improvements on comorbid behavioral problems has not yet been systematically investigated.

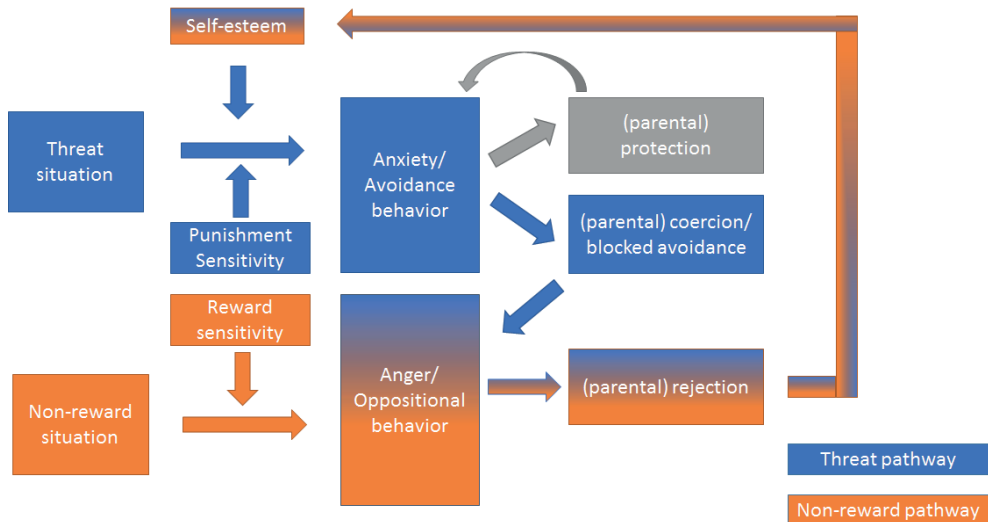
## **Flight and fight responses in persons with anxiety disorders**

To increase the prospects for these CYP with comorbidity, it is important to get more insight into the underlying processes of this comorbidity. The first that may come to mind when considering underlying processes of the comorbidity of anger/behavioral problems and anxiety problems, is the “fight or flight” response. These two different responses to threat were first mentioned by Cannon (1922) in the context of describing physiological reactions to strong emotions. Although temperament researchers have highlighted the relevance of both flight and fight as responses to threat (Gray & McNaughton, 2000) the anger response has received only scant attention in the context of anxiety disorders. By far, most attention has been paid to fear-avoidance as the crucial response in the development and maintenance of anxiety disorders.

The current dissertation takes the flight-and-fight response to threat as the starting point of a more elaborate model of the mechanisms involved in the generation of comorbid behavioral problems in CYP with anxiety disorders. This model (Figure 1) implies two sources of anger/behavioral problems, namely through threat and through frustration of non-achieved reward, and proposes that rejective responses from the environment to the CYP’s oppositional behaviors will foster negative self-esteem that further contributes to the maintenance of CYP’s anxiety. Reward and punishment sensitivity are proposed as moderators in these different pathways to comorbid behavioral problems in CYP with anxiety disorders.

**Figure 1**

Model indicating the two proposed pathways to comorbid behavioral problems and the maintaining loop of rejection and self-esteem in CYP with anxiety disorders



The current dissertation consists of studies with varying methodologies to test the validity of the proposed pathways to comorbid behavioral problems in anxious CYP. Furthermore, it consists of studies testing predictions based on the model with regard to treatment outcome. In this chapter, I will first explain the various concepts that are included in the model (see Figure 1) and discuss the current state of knowledge of these concepts in relationship with anxiety and behavioral problems. Then, I will describe how these concepts could be related in the proposed model. This chapter ends with an outline of the dissertation.

## Punishment and reward sensitivity

Imagine you participate in a trial lesson for a tennis class after which you can decide to sign up for the beginner's course. During this lesson, you got many compliments from the trainer. Probably, you feel happy and motivated to sign up for the tennis class. However, imagine that instead of getting many compliments, you got negative feedback from the trainer. You would probably feel more uncomfortable and are probably less likely to sign up for the beginner's course. This example shows that our behavior is largely determined by its consequences. When behavior is followed by positive consequences (e.g., reward) such as positive feedback, it is likely to be continued or increased in frequency. However, when behavior is followed by negative consequences (i.e., punishment) such as the rejective responses of the trainer, its

frequency is likely to decrease. This is in line with the law of effect, introduced by Thorndike (1932). However, although these consequences help in explaining individual behavior, not all people show the same behavior in similar circumstances. Some people will still sign up for the tennis course although they received negative feedback, whereas others will definitely not do so. These individual differences may be partly explained by differences in how sensitive persons are to reward and punishment (Gray, 1970; Gray & McNaughton, 2000). For those with high punishment sensitivity, negative feedback following trying tennis for the first time will probably have a greater influence on not signing up for the beginner's course than for those who are relatively insensitive to punishment.

These concepts of punishment sensitivity (PS) and reward sensitivity (RS) arrive from the Reinforcement Sensitivity Theory (Gray, 1970; and the revised version, Gray & McNaughton, 2000). According to this theory, punishment and reward sensitivity each consist of different components, namely responsivity (how much punishment/reward influences your affect), motivation to avoid punishment/approach reward, and attention to punishing/rewarding signals in the environment. People with high punishment sensitivity will have a more negative response to punishment, a stronger motivation to avoid punishment, and more attention to cues signaling punishment. People with high reward sensitivity will have a more positive response to reward, a stronger motivation to approach reward and more attention to cues signaling rewards. For example, getting a low grade will have more impact on a child with high PS compared to a child with low PS and will motivate the child with high PS to increase behavior that will help in preventing failing a test again in the future, for example by studying harder. Getting a high grade will have more impact on a child with high RS compared to a child with low RS and will motivate the child to work hard in the future to continue getting such high grades.

These sensitivities for punishment and reward are presumed to represent orthogonal dimensions that can vary independently in strength, indicating that within a population people exist with all combinations of high and low punishment sensitivity and reward sensitivity (Carver & White, 1994). Individuals with high punishment sensitivity and/or reward sensitivity are expected to have an increased risk for developing mental health problems (Pickering & Gray, 1999). Multiple empirical studies have indeed linked punishment sensitivity with anxiety disorders and reward sensitivity with behavioral problems (Bijttebier, Beck, Claes, & Vandereycken, 2009).

Punishment sensitivity may be a factor contributing to the development of comorbid behavioral problems in CYP with anxiety disorders. There is ample evidence that children with high punishment sensitivity have an increased risk of developing anxiety symptoms (Bijttebier et al., 2009; Izadpanah et al., 2016; Takahashi, Roberts, Yamagata, & Kijima, 2015; Vervoort



et al., 2010). This heightened punishment sensitivity may also make them more vulnerable for developing comorbid behavioral problems. People with high punishment sensitivity have a relatively strong inclination to interpret ambiguous situations in a threatening way (Gray, 1970; Gray & McNaughton, 2000; Kimbrel, 2008). Importantly, perceived threat may not only elicit anxiety (flight), but also defensive anger/oppositional behaviors (fight). Multiple studies showed that anger is a defensive- and protective mechanism against threat of the person or his/her surrounding (Cassello-Robbins & Barlow, 2016; Harmon-Jones 2003, Harmon-Jones, Abramson, & Peterson, 2009). This defensive response is especially expected in situations with high levels of immediate perceived threat where people feel that they cannot avoid this threat (Blair, 2012; Cassello-Robbins & Barlow, 2016). Because people with high punishment sensitivity will be more inclined to experience threat, they may also be more inclined to respond with reactive aggression/anger in ambiguous situations that may be interpreted as threatening (Corr, 2013). Therefore, high punishment sensitivity may be a risk factor for developing comorbid behavioral problems in CYP with anxiety disorders.

A second factor that may heighten the risk for developing comorbid behavioral problems in CYP with anxiety disorders is high reward sensitivity. Multiple studies have indicated an association between reward sensitivity and behavioral problems. More specifically, reward sensitivity has been associated with self-reported conduct problems in clinical adolescents (Morgan, Bowen, Moore, & van Goozen, 2014), trait anger in non-clinical students (Harmon-Jones, 2003; Smits & Kuppens, 2005), self-reported verbal and physical aggression in non-clinical students (Smits & Kuppens, 2005), and self-reported hostility in non-clinical students (Harmon-Jones, 2003). People with high reward sensitivity are highly motivated to gain rewards, more responsive to reward, and have more attention to cues signaling reward in the environment. In addition, people with high reward sensitivity have higher reward expectancies in ambiguous situations that may involve potential rewards (Gray, 1970; Gray & McNaughton 2000; Corr, 2002). This may result in the person taking action to gain the reward (Reniers, Murphy, Lin, Bartolomé, & Wood, 2016), and may have beneficial effects in daily life when these rewards are indeed obtained (Rawal, Collishaw, Thapar, & Rice, 2013). However, given their high reward expectancy, they are also more prone to detect non-reward (rewards with a lower than expected frequency or lower level of reward), which may lead to anger and oppositional behaviors out of frustrative non-reward (Carver, 2004; Corr, 2002, 2013; Harmon-Jones, 2003; Hundt et al., 2013). Therefore, high reward sensitivity may make CYP with anxiety disorders more vulnerable for developing comorbid behavioral disorders.

## **Maintaining factors: Rejection from the environment and self-esteem**

Comorbid behavioral problems in CYP may also indirectly contribute further to the maintenance of CYP's anxiety. Behavioral problems in CYP have been associated with parental and peer rejection (Beveridge & Berg, 2007; Evans, Pederson, Fite, Blossom, & Cooley, 2016; Kochanska, Friesenborg, Lange, & Martel, 2004; Locke, Miller, Seifer, & Heinze, 2015; Modesto-Lowe, Danforth, & Brooks, 2008; Reijntjes et al., 2011). A review on the transactional processes in parent-adolescent interactions on parental and adolescent outcomes (Beveridge & Berg, 2007) indicated that adolescents influence their parents' rejective behaviors in a reciprocal and sequential manner. When adolescents are angry and oppositional, parents are found to be more prone to engage in rejective behaviors such as guilt induction, hostile sarcasm, and coercive controlling behaviors (Beveridge & Berg, 2007). Importantly, rejective responses from the environment have, in turn, been related to lower self-esteem (Giaouzi & Giovazolias, 2015; Ramírez-Uclés, González-Calderón, del Barrio-Gándara, & Carrasco, 2018). Self-esteem represents the affective, or evaluative, component of the self-concept, it indicates how people feel about themselves (Leary & Baumeister, 2000). In a meta-analysis of 18 longitudinal studies with participants' age ranging from childhood to old age, it was found that negative self-esteem was predictive of anxiety symptoms (Sowislo & Orth, 2013a). A more recent study focusing on early adolescence (13 years of age) similarly showed that relatively low self-esteem was predictive of relatively high anxiety symptomatology at 2-years follow up (Van Tuijl, De Jong, Sportel, De Hullu, & Nauta, 2014). In this way, CYP with anxiety disorders who also show these comorbid behavioral problems may get stuck in a loop when they receive rejective responses from their environment: these rejective responses to their behavioral problems may lower their self-esteem and thereby contribute to the maintenance of their anxiety.

## **Model**

Based on the previously discussed findings, the model depicted in Figure 1 implies two pathways that may help explain how CYP with anxiety disorders come to show this angry/oppositional face. The first pathway (threat pathway) proposes that anger/oppositional behaviors in CYP with anxiety disorders may arise from anxiety-provoking situations, where CYP experience threat and the option to avoid is blocked. It is expected that this defensive anger/oppositional behavior out of inescapable threat is especially evident in anxious CYP with high punishment sensitivity. The second pathway (non-reward pathway) indicates that CYP can become angry/oppositional out of non-reward situations. It is expected that this frustrative anger/oppositional response out of non-reward is especially evident in anxious CYP with high reward sensitivity.

The model further proposes that this comorbid profile of anxiety and behavioral problems is maintained by rejective responses from the environment and lowered self-esteem of the CYP. It is important to identify/disentangle these two pathways, since these different routes to comorbid behavioral problems in anxiety-disordered CYP may ask for different interventions. If these comorbid behavioral problems indeed arise out of the threat pathway, anxiety focused treatment is expected to be sufficient for also treating the behavioral problems, given that these threat situations are targeted in the treatment. However, if these behavioral problems arise out of the non-reward pathway, another treatment approach or the addition of modules focusing on the behavioral problems may be necessary.

## Outline of this dissertation

The studies described in this dissertation were designed to test the validity of this model and predictions with regard to treatment outcome based on the model, combining different methodological approaches.

The study described in chapter **2** investigated the fundamental idea of the model that anger problems could arise from high PS and/or high RS. A series of previous studies that used a scenario approach already provided evidence for such relationships between PS/RS and anger in adults (Carver, 2004; Cooper, Gomez, & Buck, 2008; Harmon-Jones, 2003). The current study was designed to replicate and extend these findings in an adolescent sample. Following a similar scenario approach, this study first tested the robustness of the previous findings of higher anger responses in individuals with relatively high reward and/or relatively high punishment sensitivity. As an important next step, the mechanisms that were proposed to underlie these relationships were examined. More specifically, it was examined whether the association between PS and anger was mediated by perceived threat (threat pathway), and whether the association between RS and anger was mediated by perceived non-reward (non-reward pathway) (see Figure 2).

Chapter **3** and **4** focused on the relationship between reinforcement sensitivity and both anxiety symptoms and behavioral problems in a large longitudinal population cohort (Tracking Adolescents' Individual Lives Survey; TRAILS). We used a behavioral task that measures the attentional proneness for cues signaling punishment and for cues signaling reward to index punishment sensitivity and reward sensitivity respectively. The study presented in chapter **3** more specifically examined whether punishment and reward sensitivity in adolescence were cross-sectionally related to anxiety symptoms and behavioral problems, and investigated whether punishment and reward sensitivity as measured in adolescence can predict anxiety symptoms and behavioral problems six years later. The study described in chapter **4** looked at the relation between reinforcement sensitivity and comorbid behavioral problems in highly

anxious CYP. In this study, it was investigated whether punishment and reward sensitivity were related to comorbid behavioral problems in highly anxious adolescents and highly anxious young adults. Furthermore, it was investigated whether behavioral problems in adolescence are a risk for developing anxiety in young adulthood, whether this association between behavioral problems in adolescence and anxiety symptoms in young adulthood was mediated by parental rejection, and whether this was especially the case for adolescents with higher punishment sensitivity.

Chapter 5 contains the preregistration of a study that was designed to examine the proposed pathways to comorbid behavioral problems in the daily lives of CYP with anxiety disorders in a sample of CYP referred for treatment to a mental health clinic. Furthermore, this study was designed to investigate the maintaining loop of behavioral problems of the anxious CYP eliciting rejective responses from the environment, resulting in lowered self-esteem of the anxious CYP. In order to investigate this, an ecological momentary assessment approach was used. This design allowed to investigate whether indeed daily interactions in which CYP with anxiety disorders experience pressure to do something threatening as well as situations of non-reward are related to feelings of anger and oppositional behaviors. It was expected that these associations were mainly evident in CYP with comorbidity. Moreover, we expected that anger/oppositional responses out of threat situations were especially evident in anxious CYP with high punishment sensitivity, whereas anger/oppositional responses out of non-reward were expected to be most evident in anxious CYP with high reward sensitivity. Furthermore, anger and angry behavior of the adolescents were expected to be associated with more rejective responses from others, which was expected to result in lowered self-esteem of the adolescents. Data collection has not yet finished, and the chapter presents the preregistration of the study with the theoretical background and all methodological aspects of the study. The results section is limited to some reflections on the data collection.

Our model also leads to specific predictions with regard to treatment outcome for CYP with anxiety disorders suffering from comorbid behavioral problems following anxiety-focused CBT. It is expected that when behavioral problems arise out of the threat pathway, behavioral problems would reduce when CYP with anxiety disorders receive anxiety-focused CBT. In order to test the general effect of anxiety-focused CBT on behavioral problems one preferably integrates the effects found in multiple studies. Therefore, the meta-analysis described in chapter 6 focused on the effects of anxiety-focused CBT on behavioral problems in CYP with anxiety disorders.

Finally, it was expected that the two pathways to comorbid behavioral problems in anxiety-disordered CYP would be differentially related to the outcome of anxiety-focused CBT. If these comorbid behavioral problems would indeed arise out of the threat pathway, anxiety

focused treatment was expected to be sufficient for also treating the behavioral problems, given that these threat situations were targeted in treatment. However, if these behavioral problems would arise out of the non-reward pathway (expected in CYP with heightened RS), another treatment approach or the addition of modules focusing on the behavioral problems was expected to be necessary, given that these non-reward situations were probably not adequately targeted in anxiety-focused CBT. The major aim of the study described in chapter 7 was to test whether indeed high PS and/or high RS were associated with having comorbid behavioral problems. In addition, it was investigated whether behavioral problems generally reduced following anxiety-focused CBT. Subsequently it was explored if CYP with comorbidity and relatively high RS scores would show a relatively limited reduction in behavioral problems following anxiety focused CBT. Finally, it was generally explored how change trajectories of behavioral problems related to those of anxiety problems and to what extent these change trajectories of behavioral problems were related to PS and RS.

In chapter 8, the findings from the chapters were integrated in order to discuss the evidence for the validity of the proposed model and the expected treatment outcomes. Furthermore, the theoretical and clinical relevance of the findings was discussed, also taking in consideration the strengths and limitations of the studies. This chapter finishes with future perspectives and concluding remarks.