Université de Montréal

The Relationship between Co-rumination and Different Forms of Normative Anxiety in Quebec Youth

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Résumé

Les amis peuvent compter l'un sur l'autre lorsqu'ils sont confrontés à des problèmes, mais certaines discussions peuvent conduire à la co-rumination. La co-rumination apparaît tôt dans la vie et a été associée à diverses formes de symptômes anxieux et/ou à des désordres cliniques d'anxiété. Toutefois, peu d'études ont exploré l'association entre la co-rumination et les formes d'anxiété normative incluant l'anxiété d'état, de trait, de performance et la sensibilité à l'anxiété. Ce mémoire examine la relation entre la co-rumination et ces formes d'anxiété normative en tenant compte du sexe et de l'âge. Au total, 1204 enfants (âgés de 11 à 12 ans) et adolescents (âgés de 16 à 17 ans) ont été recrutés dans des écoles primaires et secondaires du Québec. Ils ont rempli des questionnaires mesurant la co-rumination et les quatre formes d'anxiété normative dans leurs classes. Les résultats ont révélé que la co-rumination était associée à une seule forme d'anxiété normative (sensibilité à l'anxiété) chez les enfants et à trois formes (trait, performance et sensibilité à l'anxiété) chez les adolescents. Ainsi, la co-rumination semble associée différemment à certaines formes d'anxiété normative en raison de facteurs développementaux. De futures études confirmatoires et longitudinales devraient examiner les hypothèses générées par les résultats de cette étude exploratoire. Au-delà des implications discutées dans l'article, ce mémoire présente des pistes de recherche potentielles et des considérations pour de futures études portant sur la relation entre la co-rumination et les différentes formes d'anxiété normative.

Mots-clés : Co-rumination, anxiété d'état, anxiété de trait, anxiété de performance, sensibilité à l'anxiété, enfants, adolescents

Abstract

Friends can rely on each other when faced with problems, though these discussions may lead to co-rumination. Co-rumination occurs early in life and has been associated with various forms of anxiety symptoms and/or clinical anxiety disorders. However, a scarcity of literature has explored the association between co-rumination and forms of normative anxiety, including state anxiety, trait anxiety, test anxiety, and anxiety sensitivity. This thesis examined the relationship between co-rumination and these forms of normative anxiety while considering sex and age. In total, 1204 children (ages 11 to 12) and adolescents (ages 16 to 17) were recruited from elementary and high schools in Quebec. Participants completed questionnaires measuring co-rumination and the four forms of normative anxiety in their classrooms. The results revealed that co-rumination was associated with one form of normative anxiety (anxiety sensitivity) in children and three forms (trait anxiety, test anxiety, and anxiety sensitivity) in adolescents. Thus, co-rumination may be differentially associated with various forms of normative anxiety due to certain developmental factors. Future longitudinal confirmatory studies should test the hypotheses generated from the findings of this exploratory study. Beyond the implications discussed in the article, this thesis features potential research avenues and considerations for future studies investigating the relationship between co-rumination and different forms of normative anxiety.

Keywords: Co-rumination, state anxiety, trait anxiety, test anxiety, anxiety sensitivity, children, adolescents

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List of acronyms and abbreviations

ACTH: Adrenocorticotropin

BIC_{10}: Bayesian Information Criteria

CASI: Childhood Anxiety Sensitivity Index

CESH: Centre for Studies on Human Stress

CIUSSS: Centre intégré universitaire de santé et de services sociaux

CRH: Corticotropin-releasing hormone

CTAS: Children's Test Anxiety Scale

DOI: Digital Object Identifier

DTS: Distress Tolerance Scale

HPA: Hypothalamic-pituitary-adrenal axis

MATA: My anxiety or your anxiety? Association between stress and anxiety in children, their parents and teachers

NUTS: Novelty, Unpredictability, Threatening to the ego, Sense of low control

STAI-C: State-Trait Anxiety Inventory for Children

SWAT: Studies Web Automation Tool

TSST: Trier Social Stress Test

Dedicated to those who need reminding that

"The man who moves a mountain begins

by carrying away small stones".

-Confucius

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Chapter 1 – Introduction

Friendships

Importance and presence of friends during childhood and adolescence

Friendships play a vital role in the lives of humans (Dunbar, 2018). Friendships are beneficial for self-esteem, well-being (Hartup & Stevens, 1999), and help the individual acquire skills that are essential for various areas of development (e.g., social and emotional; Guralnick et al., 2007).

The importance and presence of friendships emerge early in life and evolve exponentially thereafter. Beginning in early childhood, preferences for certain individuals are observed and interactions with friends are distinct from those with non-friends (Rubin et al., 2006). In school-age children, a notable change occurs in the role friendships play as the child attends school and has contact with a broader range of peers (Rubin et al., 2006). Moreover, these peer interactions extend beyond the classroom walls, as children spend time together at parties, engaging in sports, among other activities (Zarbatany et al., 1990). During adolescence, friends occupy a larger importance in an individual's life (Sherman et al., 2000). Indeed, compared to individuals of other age groups, adolescents spend the most time with their friends (Lowenthal et al., 1975, as cited in Sherman et al., 2000), such that they spend approximately one-third of their time with them (Hartup & Stevens, 1999). Thus, the tendency to rely on friends for support compared to parents increases during adolescence (Furman & Buhrmester, 1992), where social support refers to having people to rely on, whom express their love, and care for us (Sarason et al., 1983). Overall, friendship plays a major positive role for children and adolescents (Rubin et al., 2008).

Relying on friends in times of need

When faced with problems, friends can have a beneficial role. For instance, friends can help to cope with life problems (Hartup & Stevens, 1999) and provide help when needed (e.g., by providing emotional support; van der Horst & Coffé, 2012). Individuals can gain emotional support by self-disclosing with others (Yang et al., 2019). Moreover, an individual may talk about

a personal problem with another person if that individual needs assistance to regulate their emotions (Waller et al., 2014).

Self-disclosure

Self-disclosure is a commonly used strategy to cope with a negative event and refers to the communication of personal information to another person, such as talking about their emotions (Smith & Medvin, 2016). Different concerns and issues can motivate an individual to seek out social support through means of self-disclosure, including developmentally relevant problems (e.g., school transitions, puberty) and infrequent life events (e.g., accidents; Buhrmester & Prager, 1995). In friendships at a young age, self-disclosure is important and may be beneficial (Berndt & Hanna, 1995). For instance, self-disclosure allows the person providing the support to have a better understanding of the situation and respond with more tailored advice (Yang et al., 2019). In addition, self-disclosure with friends can provide insight into a problem (Smith & Medvin, 2016).

At 11 to 13 years of age, individuals will self-disclose with friends as it is recognized that friends actively try to understand one another (Rubin et al., 2006). However, self-disclosure begins to play a more prominent role during teenage years (Rubin et al., 2006). A similar shift has been observed for emotion regulation as a study found that 15-year-olds were more effective at regulating their emotions than individuals ages 12 and 13 (Theurel & Gentaz, 2018).

Emotions and emotion regulation

For many years, scientists have struggled to agree on the definition of emotion as it is a multifaceted process (Izard, 2009) that involves physiological, behavioural, and cognitive elements (Thompson, 1994). Emotion regulation refers to processes that an individual will use to monitor, evaluate, and modify emotions (Thompson, 1994) and, therefore, will influence how, when, and what emotions are felt (Gross, 1998). These emotion regulation processes can be used to accomplish a goal (e.g., appear less upset in public) or have hedonic motivations (e.g., feel less negative; Gross et al., 2011). Further, these processes can be applied to both positive and negative emotions (Webb et al., 2012).

Regarding their associations with psychopathology, emotion regulation strategies can either be adaptive (be negatively associated with disorders) or maladaptive (contribute to or maintain disorders; Aldao & Nolen-Hoeksema, 2010). For example, problem-solving is an adaptive emotion regulation strategy (Aldao & Nolen-Hoeksema, 2010). Problem-solving aims to solve a problem (e.g., brainstorming possible solutions to the problem), where the success of these behaviours can influence emotions (Aldao et al., 2010). In contrast, rumination is a maladaptive emotion regulation strategy (Aldao et al., 2010) that involves thoughts and behaviours revolving around personal distress and the possible implications of this distress (Nolen-Hoeksema, 1991). Interestingly, rumination can also hinder problem-solving (Lyubomirsky & Tkach, 2004).

The ability to regulate one's own emotions develops from a young age and throughout the adolescent period (Eisenberg & Sulik, 2012). Despite this, it has been noted that young people still rely on others to regulate distress (Stone et al., 2017). In addition, as adolescents rely substantially on their friends for their social needs, the ability of their friends to help with their emotional regulation becomes of utmost importance (Waller et al., 2014). Concretely, when faced with a problem, friends who promote problem-solving may help their friend regulate their emotions more effectively (Waller et al., 2014).

Taken together, friends can play a beneficial role for individuals when they are faced with problems. Nonetheless, talking about problems with a friend may also lead to the use of ineffective emotion regulation strategies such as co-rumination (Stone et al., 2019; Waller et al., 2014).

Co-rumination

The construct of co-rumination was introduced into the scientific literature by Amanda Rose in 2002. Rose (2002) defined co-rumination as a dyadic process (i.e., occurring between two people) and proposed nine content areas to describe the different elements of co-rumination: 1) the frequency that problems are discussed, 2) discussing problems rather than doing other activities, 3) friend A encouraging friend B to discuss their problems, 4) friend B encouraging friend A to discuss their problems, 5) rehashing or repeated discussion of the same problem, 6) speculating about why the problem occurred (causes), 7) speculating about what might happen because of

the problem (consequences), 8) speculation about misunderstood aspects of the problem, and 9) a focus on negative feelings the problem makes them feel (anger and sadness). Co-rumination has been described as lying at the cross-roads of self-disclosure and rumination as co-rumination involves discussions about feelings and a focus on the negative emotions provoked by a problem. Nevertheless, co-rumination is its own unique construct as it involves a more intense version of self-disclosure and occurs within a dyad, unlike rumination (Rose, 2002).

Initially, co-rumination was described as a behaviour that occurs in same-sex friendships (Rose, 2002). Though due to the likelihood of the behaviour in other dyadic relationships, studies have investigated co-rumination in roommates, romantic partners, parents (Calmes & Roberts, 2008), co-workers (Boren, 2014), and strangers (Zelic et al., 2017). These findings have revealed that co-rumination occurs within several different relationships. With that said, a large body of research has studied and continues to study co-rumination within friendships (Spendelow et al., 2017).

Methods of studying co-rumination

Several methods have been employed to study co-rumination. First, the original 27-item questionnaire (The Co-rumination Questionnaire) was developed to evaluate co-rumination with a same-sex friend in children and adolescents (Rose, 2002). Since, several shortened versions of the original questionnaire have been used in the literature (Arroyo et al., 2017; Haggard et al., 2011; Hankin et al., 2010; Jose et al., 2012; Stone et al., 2011). In contrast to studying global or trait-like co-rumination via questionnaires, studies have also investigated daily co-rumination behaviours with online daily-diary paradigms where participants complete a shortened version of the co-rumination questionnaire over a week (Hruska et al., 2017; White & Shih, 2012). Similarly, ecological momentary assessments can be used to study co-rumination in daily life by evaluating functioning within social interactions (Waller et al., 2014).

In recognizing the limitations of self-report measures, researchers have also suggested using observational methods to study co-rumination (Calmes & Roberts, 2008; Rose et al., 2007). An observational assessment measure was developed in 2005, where a dyad generates a list of current problems and is later asked to discuss one (or more) of these problems within the dyad (Rose et al., 2005, as cited in Rose et al., 2014). According to four different aspects of co-

rumination (rehashing, speculation, focus on negative feelings, and encouraging problem talk) and how much time is spent discussing a problem, the dyad's interactions are coded by experimenters to obtain a total co-rumination score (Rose et al., 2014). Several observational studies have successfully used this method to generate co-rumination in a laboratory setting (Byrd-Craven et al., 2008, 2011; Rankin et al., 2018; Rose et al., 2014).

Overall, various different methods have been implemented in the literature to study co-rumination. However, most studies in the field have relied on self-report measures to quantify co-rumination (Zelic et al., 2017).

Samples studied in the co-rumination literature

Co-rumination has been studied in both clinical and non-clinical samples. For instance, studies have examined co-rumination in individuals with depression (Stone et al., 2010, 2011; Waller et al., 2014) and anxiety disorders (Stone et al., 2019). Though, a vast number of studies have investigated co-rumination in non-clinical samples, stemming from the community (Keshishian et al., 2016; Starr & Davila, 2009), universities (Arroyo, 2013; Dombrowski, 2014), and grade-school districts (Hruska et al., 2017; Rose et al., 2007).

Co-rumination has also been observed in different age groups. Since the first study on co-rumination in a sample of children and adolescents (Rose, 2002), an abundance of research has continued to explore co-rumination in children and adolescents of varying ages (Ioffe et al., 2020; Ohannessian et al., 2021; Rose et al., 2014; Waller & Rose, 2010). Moreover, co-rumination research has been conducted in older age groups such as university students (Carlucci et al., 2018; White & Shih, 2012), working adults (Boren, 2014), and the elderly (Kroemeke, 2019). With that said, it is of particular interest to continue studying co-rumination in children and adolescents as the behaviour may emerge at a young age. If so, intervention programs could re-educate children and adolescents on the appropriate nature to deal with problems to potentially prevent the continuation of co-ruminative behaviours into adulthood and possibly mitigate the associated negative characteristics.

Different characteristics of co-rumination

The literature on co-rumination has reported associations with both positive and negative characteristics. These characteristics may be attributable to the elements of intense self-disclosure and an extensive focus on negative feelings during co-rumination (Rose, 2002). With regards to the positive characteristics, co-rumination has been positively associated with friendship quality and closeness (Felton et al., 2019; Rose, 2002; Rose et al., 2007). Rose et al. (2007) stated that it is reasonable for friends to feel more positive towards their relationship following co-rumination as it involves intimate and intense discussions. However, the negative characteristics of co-rumination have also been identified as it has been associated with perceived stress (Boren, 2014) and increased levels of stress hormones (Byrd-Craven et al., 2008). Beyond this, a multitude of studies have focused on the association between co-rumination and psychopathology. For instance, co-rumination has been associated with increases in concurrent and prospective internalizing symptoms such as depression and anxiety (Calmes & Roberts, 2008; Rose, 2002; Rose et al., 2007; Starr & Davila, 2009). In the first article on the subject, co-rumination was proposed to be associated with anxiety as it intensifies worries about problem resolution and the negative consequences of a problem (Rose, 2002). Said differently, co-rumination may project the participating dyad into a state of anticipation, which may explain its link with anxiety.

Anxiety

When an anticipated threat is detected, the brain elicits a wide variety of behavioural, cognitive, emotional, and physiological reactions (Puleo et al., 2011). For example, these reactions can include behavioural avoidance of the threat, hypervigilance, nervousness, and sweating, respectively (Chand & Marwaha, 2021). Collectively, these reactions are referred to as anxiety, which is defined as an adaptive basic emotion that helps us avoid danger (Beesdo et al., 2009). Anxiety is distinct from fear, as the latter is a negative state of emotion when faced with an immediate threat (Salum et al., 2013). Anxiety is apparent early on in infancy and childhood (Beesdo et al., 2009), though its adaptive role may become particularly apparent in adolescence as this period is marked by an increased desire to experiment with the world (Puleo et al., 2011).

Anxiety on a continuum

As described by Muris (2007), the dynamic multifactorial model states that anxiety levels are a product of the interaction between numerous factors. Specifically, these interactions occur between an individual's development stage, vulnerability factors (e.g., genetic transmission of anxiety symptoms), and protective factors (e.g., perceived control of internal and external events) to produce a certain level of anxiety. A greater abundance of protective factors (compared to vulnerability factors) is associated with tolerable levels of anxiety. In contrast, anxiety levels may become disordered if there is a greater abundance of vulnerability factors. Consequently, anxiety can be described on a continuum, where anxiety levels can range from normal (or normative) to pathological (Muris, 2007).

Anxiety can be experienced as moderate and severe, where severe anxiety levels make up the higher end of the continuum (Endler & Kocovski, 2001). When experienced at the upper end of the continuum, an individual's response is considered disproportionate to the extent of the threat, can cause impairment and/or distress, and can be referred to as an anxiety disorder (Salum et al., 2013). When levels are found at the lower end of the continuum, anxiety can play an adaptive role (Endler & Kocovski, 2001) as it can aid the individual to avoid threats in their environment and is not considered pathological (Beesdo et al., 2009).

Normative anxiety

Children and adolescents experience certain fears and anxieties within the context of their normal development (Beesdo et al., 2009; Craske & Stein, 2016). Young children (around three years old) tend to fear imminent threats (e.g., thunder), whereas fears become more abstract and involve elements of anticipation with cognitive maturation (Beesdo-Baum & Knappe, 2012). For instance, school anxiety can manifest in school-age children (6 and 12 years old; Craske & Stein, 2016). Normative anxiety can also arise from life stress (Craske & Stein, 2016). In both contexts, normative anxiety is a transient emotion and only becomes diagnosable as an anxiety disorder if these transient preoccupations persist beyond developmental trends/life stress and cause impairments in quality of life (Beesdo-Baum & Knappe, 2012; Craske & Stein, 2016). With this,

normative anxiety varies from low to moderate levels of anxiety (Broeren et al., 2013; Weems, 2008) and is distinct from clinical anxiety disorders (Craske & Stein, 2016).

Examples of different forms of normative anxiety in the literature

Since being described several decades ago, four different forms of normative anxiety including state anxiety (Spielberger, 1966), trait anxiety (Spielberger, 1966), test anxiety (Spielberger & Vagg, 1995), and anxiety sensitivity (Reiss et al., 1986) have been thoroughly studied.

Spielberger (1972) described state anxiety as a transient emotional state and refers to how a person feels at a given moment in time. State anxiety can be experienced through feelings of tension, nervousness, worry, apprehension, and physiological arousal. Furthermore, state anxiety can be elicited by two types of threats: internal (e.g., realizing that you did not adequately prepare for an examination) and external (e.g., a student being called upon to answer a question from a teacher). A nonthreatening situation would elicit low levels of state anxiety, whereas a threatening situation would induce high levels. Spielberger (1972) described trait anxiety as an indicator of anxiety proneness. For example, high trait anxiety predisposes an individual to view a wide range of situations as threatening and respond to these situations with high levels of state anxiety (Spielberger, 1972). For this reason, trait anxiety has been described as a stable personality characteristic (Wiedemann, 2001).

Test anxiety occurs when an individual evaluates their resources as being insufficient to meet the demands of the evaluation (Zeidner, 2007) and can involve a concern about the potential negative consequences or failure of an evaluation (Zeidner, 2010). Thus, individuals with test anxiety view evaluations as threatening (Zeidner & Matthews, 2003) as they believe they are ill-equipped to handle the evaluation (i.e., the demands of the evaluation exceed their capabilities; Zeidner, 2010). Further, test anxiety is specific to evaluation situations only (Wren & Benson, 2004). According to Wren and Benson (2004), test anxiety manifests through thoughts, autonomic reactions, and off-task behaviours. For example, these manifestations include thoughts of worry during the evaluation (e.g., self-critical thoughts), physiological reactions (e.g., sweating), and engaging in behaviours that are unrelated to the evaluation itself (e.g., distraction behaviours),

respectively (Wren & Benson, 2004). Similar to trait anxiety, test anxiety has also been described as a situation-specific personality trait (Sarason & Sarason, 1990).

Lastly, anxiety sensitivity refers to an individual's fear of their own physiological sensations of anxiety, such as a rapid heart rate (McNally, 1990). This fear may develop from the belief that these physiological sensations will have negative consequences (McNally, 1990). These consequences could be physical (e.g., having a heart attack), psychological (e.g., experiencing additional anxiety), and social (e.g., embarrassment), as well as concerns of losing control (e.g., of their emotions; Reiss et al., 1986). As a result of this fear, anxiety sensitivity can increase worries of experiencing anxiety, as well as an individual's alertness and motivation to avoid stimuli that could provoke anxiety (Reiss et al., 1986). Anxiety sensitivity has also been described as a trait-like cognitive vulnerability (Olatunji & Wolitzky-Taylor, 2009) that can be malleable (Wolitzky-Taylor et al., 2015).

Relationship between co-rumination and normative anxiety

Despite the considerable bodies of literature describing the aforementioned four forms of normative anxiety (state anxiety, trait anxiety, test anxiety, and anxiety sensitivity), most studies investigating the association between co-rumination and anxiety have used a wide variety of other measures of anxiety. The questionnaires used in these studies range from measures of various forms of anxiety symptoms (e.g., as measured by the Revised Children's Manifest Anxiety Scale; Reynolds & Richmond, 1978) and/or clinical anxiety disorders. Overall, most of these studies have found a positive association between co-rumination and anxiety (see Appendix 1). A recent systematic review and meta-analysis exploring the association between co-rumination and internalizing problems (including measures of anxiety, depression, and mood) found small to moderate effects across all measures of internalizing problems (Spendelow et al., 2017). Despite this, the authors noted that a larger proportion of studies have focused on co-rumination and depression compared to studies examining the link between co-rumination and anxiety (Spendelow et al., 2017). This is echoed by the fact that to date, no meta-analysis has explored solely the relationship between co-rumination and anxiety. Nonetheless, the select studies in the

paper by Spendelow et al. (2017) addressing co-rumination and anxiety are included in the table featured in Appendix 1.

The importance of studying the association between co-rumination and different forms of anxiety has been underlined in the literature. Starr and Davila (2009) noted the importance of studying this relationship as different forms of anxiety might have varying and distinct associations with co-rumination. Several years later, these ideas were echoed by Griffiths (2017) who noted that future research should explore the association between co-rumination and different forms of anxiety. Collectively, these authors identified the necessity for future studies to explore the relationship between co-rumination and other forms of anxiety to understand how each form uniquely relates to co-rumination. To this end, there is a scarcity of literature addressing the relationship between co-rumination and normative anxiety. A study by Keshishian et al. (2016) in 85 adults found that greater co-rumination was associated with greater levels of state anxiety. In addition, results stemming from a large sample of 441 undergraduate students found a positive and significant association between body-specific co-rumination (i.e., focusing on body-related problems) and trait anxiety (Doyle, 2013). However, no studies to our knowledge have examined test anxiety and anxiety sensitivity in relation to co-rumination.

Importance of considering sex and age

When studying the association between co-rumination and normative anxiety, it is important to consider sex and age as differences have been observed in the literature.

Sex differences in co-rumination

Sex differences have been consistently reported in the literature as girls co-ruminate more than boys in children and adolescents (Rose, 2002; Schwartz-Mette & Rose, 2012; Tompkins et al., 2011).

Key sex differences in peer relationships between girls and boys may provide insight into the observed sex differences in co-rumination. Rose and Rudolph (2006) provided an extensive review on this matter. The authors of the review stated that in peer contexts, girls tend to have a greater number of prosocial interactions (e.g., through self-disclosure), are sensitive to others'

distress, face a larger variety of stressors, seek social support for problems, and receive higher levels of emotional support from friends. In contrast, boys gravitate towards larger peer groups, can use humor to deal with stressors, and receive less emotional support from friends. Overall, these differences may subject girls to developing more intimate relationships than boys. However, this may come at a cost, as girls are perhaps vulnerable to emotional difficulties. The authors of the review note that although some of the aforementioned sex differences in peer relationships are observable in early childhood, certain differences strengthen as individuals age into middle childhood and adolescence (Rose & Rudolph, 2006). This aligns with findings that although adolescent girls report higher levels of co-rumination than girl children, co-rumination behaviours are similar across both ages in boys (Rose, 2002). This indicates that sex differences in co-rumination become more pronounced in adolescence (Rose, 2002).

Sex differences in normative anxiety

Sex differences have also been observed using different measures of normative anxiety. In a large sample of 1404 children (ages 10-12) and adolescents (ages 15-17), girls reported higher levels of state anxiety, trait anxiety, test anxiety, and anxiety sensitivity than boys (Journault et al., 2021). These findings reflect past studies in the literature who found that females report higher levels of state anxiety (Mccleary & Zucker, 1991), trait anxiety (Lau et al., 2006), test anxiety (Wren & Benson, 2004), and anxiety sensitivity (Isolan et al., 2012) than males.

Several explanations have been proposed to explain these sex differences in normative anxiety. State anxiety is influenced by different factors (e.g., environmental factors, genetics) for males and females, whereas the influences of these factors did not vary across sex for trait anxiety (Lau et al., 2006). Furthermore, compared to males, females may report higher levels of test anxiety as they feel a greater pressure to succeed and tend to be more willing to talk about their anxiety (Núñez-Peña et al., 2016). Lastly, Stassart and Etienne (2014) suggested that their findings that girls reported higher levels of anxiety sensitivity than boys could be attributable to gender roles (i.e., masculine or feminine attributes that society allocates to males and females; Bem, 1981). As a whole, these studies suggest that sex differences in normative anxiety could be explained by a wide range of factors.

Age differences in co-rumination

Age differences have been observed when exploring co-rumination in young populations. One study found that adolescents (Grades 9 and 10) co-ruminated more than children and early adolescents (Grades 6 through 8; Hankin et al., 2010). These findings were mirrored in two samples aged 9 to 14 and 11 to 15 who found positive and significant associations between age and co-rumination, such that co-rumination increased with age (Stone et al., 2010, 2011).

The increased tendency to co-ruminate with age could be attributable to a number of reasons. First, co-rumination requires the ability to have lengthy discussions about all angles of a problem and emotions caused by a problem. Compared to adolescents, children may be less apt at articulating details about the problem or emotions they feel during co-rumination (Schwartz-Mette & Rose, 2012). Furthermore, conversational skills (e.g., staying on topic, making comments that are relevant to the conversation; Nippold 1998, as cited in Nippold, 2006) and awareness of the thoughts, feelings, and emotions of others improve during adolescence (Nippold, 2006). Thus, these factors may facilitate co-rumination in adolescents compared to children. Second, as described earlier, friends play an important role in the lives of adolescents and may explain an increased tendency to co-ruminate. In a study in early to middle adolescents (Grades 7 and 10), authors justified their choice to study co-rumination in this sample due to the importance of friends as sources of social support at this age (Rose et al., 2014). A similar rationale was used to justify studying co-rumination in a sample of students in Grades 6 through 10 (Hankin et al., 2010).

Age differences in normative anxiety

Most studies have revealed age differences when examining different forms of normative anxiety. A study found that state anxiety levels were higher in participants ages 12 to 16 than 8- to 11-year-olds (Lau et al., 2006). The literature contains mixed findings for trait anxiety as some report no age difference (ages 11 to 18; Telzer et al., 2008), while others have reported negative correlations between age and trait anxiety (ages 7 to 12; Li & Lopez, 2005). Moreover, findings from a large sample of students (ages 12 to 18) revealed that older individuals reported higher test anxiety than younger individuals (Torrano et al., 2020). Finally, a study conducted in children (ages 9 to 11) and adolescents (ages 12 to 18) found that the two age groups did not differ in their anxiety sensitivity scores (Isolan et al., 2012). Similar to most findings in the literature, a study

conducted by Journault et al. (2021) reported that adolescents scored higher on measures of state, trait, and test anxiety compared to children, though the effect sizes were small. To explain their findings, the authors proposed that factors specific to the adolescent period may explain the higher scores observed in this age group. For example, the increased number of examinations in high school compared to elementary school could explain the observed increase in test anxiety during adolescence. Although the study found that children and adolescents differed across three forms of normative anxiety, the two age groups did not differ for self-reported anxiety sensitivity (Journault et al., 2021).

To summarize, this section presented studies that have found an association between co-rumination and two forms of normative anxiety. However, it is unclear whether a relationship exists with other forms of normative anxiety and whether the association varies across the different forms. Furthermore, studies presented in this section have denoted the importance of considering sex and age when studying the relationship between co-rumination and different forms of normative anxiety.

Methodological context of the current study

According to a survey conducted by the Canadian Mental Health Association in 2018, more than half of young adults believe that depression and anxiety are an epidemic in Canada (*2018 CMHA Impact Report*, 2018). Furthermore, a Quebec survey on the health of high school students revealed that the prevalence of clinical anxiety disorders has significantly increased from 8.6% (observed in 2010-2011) to 17.2% (observed in 2016-2017; Institut de la statistique du Québec, 2018). Despite this increase, Audrey-Ann Journault, a doctoral student from the Centre for Studies on Human Stress (CESH), questioned whether factors beyond anxiety diagnoses could explain the perceived anxiety epidemic, such as forms of normative anxiety. Therefore, the doctoral student began her study entitled “My anxiety or your anxiety (MATA)? Association between stress and anxiety in children, their parents and teachers”, to investigate the following four forms of normative anxiety in a population of Quebec students: state anxiety, trait anxiety, test anxiety, and anxiety sensitivity. The principal objective was to explore whether these forms of anxiety vary across age (children versus adolescents) and in the presence of a stressful school period (end-of-

year examinations). The secondary objective was to identify the strongest predictors of these forms of normative anxiety, including societal, academic, parental, and individual predictors.

To address these two objectives, the doctoral student established an agreement with a public school board and federation of private schools north of the island of Montreal in the province of Quebec, Canada. This agreement was established with seven elementary and six high schools, for a total of 13 schools. All Grade 5 students (children ages 10 to 11) from the elementary schools and Grade 10 students (adolescents ages 15 to 16) from the high schools were invited to participate in the study. These two grade levels were targeted as students undergo important end-of-year examinations that are vital in determining their academic future in the Quebec school system.

Self-report questionnaires evaluating normative anxiety and their different predictors were administered to children and adolescents, as well as to their parent(s) and teachers. Of note, all questionnaires were administered in French. If a French version of the questionnaire was not previously available in the literature, our laboratory (CESH) used a double-blind translation technique to translate the questionnaire from English to French. Appendix 2 contains a complete list of questionnaires administered within the context of the MATA study.

The MATA study had two data collection periods (see Figure 1) to compare the four forms of normative anxiety during a stressful and normal academic period. Participating children and adolescents completed the self-report questionnaires at the first (T1) and second (T2) data collection periods. Parents of participating children and adolescents completed questionnaires at either T1, T2, or both data collections. Teachers completed questionnaires at T1 only. As shown in Figure 1, T1 occurred in May and June 2019, where the same students (who were now in the next grade level) were re-invited to participate at T2 in October and November 2019. Across both data collection periods, a small attrition rate was observed as a total of 1404 students (consisting of 298 fifth graders and 1036 10^{th} graders) participated at T1 and 1204 students (287 sixth graders and 917 11^{th} graders) at T2. Attrition was mainly a result of students changing schools or repeating a grade.

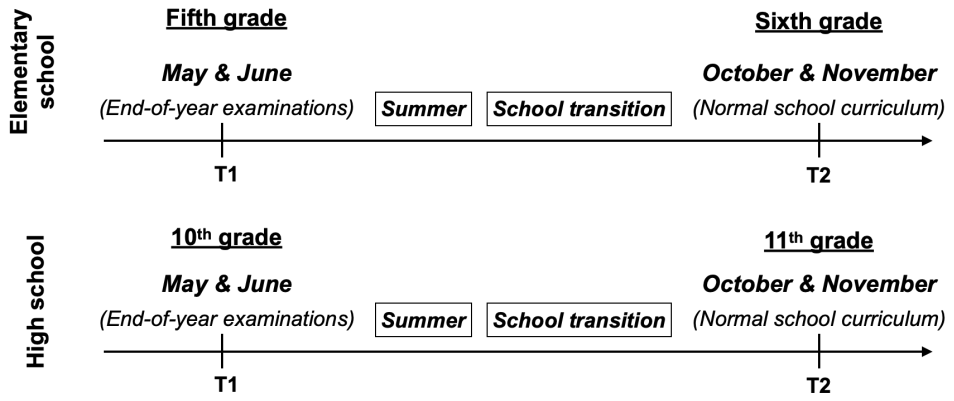

Figure 1. – Schematic Representation of the Data Collection for the MATA Project. Adapted from Journault et al. (2021)

Integration of a co-rumination questionnaire

An opportunistic collaboration was formed with the doctoral student to explore the association between co-rumination and the four different forms of normative anxiety within the context of the MATA project. Although data collection for the ongoing study began in early 2019, an addendum to include a co-rumination questionnaire within the MATA study received ethics approval on September 25th, 2019 from the Research Ethics Board of the Centre intégré universitaire de santé et de services sociaux de l'Est de l'Île de Montréal. As such, a co-rumination questionnaire was only administered during the T2 data collection period in October and November 2019.

To mitigate participant fatigue, a shortened 9-item version of the original 27-item The Co-Rumination Questionnaire (original by Rose (2002)) was integrated into the larger study. As described by Jose et al. (2012) and Arroyo (2013) who have previously used the 9-item version of the questionnaire, the items of the shortened version were selected via a factor analysis (Rose, 2002), where an item with the highest factor loading from each of the nine content areas was retained. For the purposes of the current study, the items of the shortened version were identified via an appendix of a thesis written by Arroyo (2013).

Objective

The objective of this study was to investigate the association between co-rumination and state anxiety, trait anxiety, test anxiety, and anxiety sensitivity in a sample of children and adolescents, while considering sex and age.

To fulfill this objective, secondary analyses were performed on a database created for the purposes of the MATA project. The current study is exploratory. According to Gaus et al. (2015), confirmatory and exploratory studies differ as the latter does not test a pre-determined hypothesis. Instead, findings from exploratory studies serve to generate hypotheses which can be tested later through confirmatory research (Gaus et al., 2015). Positive results from this study may generate hypotheses concerning the relationship between co-rumination and different forms of normative anxiety in Quebec children and adolescents. Despite the inability to confirm an a priori hypothesis, the exploratory nature of this study does not take away from its contribution to the literature as it may suggest fruitful research avenues (Gaus et al., 2015).

The next chapter features the scientific article entitled *When talking goes awry: Association between co-rumination and different forms of normative anxiety in children and adolescents* that was submitted to the Journal of Adolescence with corrections from the jury applied thereafter. This chapter contains additional methodological details and the results of the present study.

Chapter 2 – Scientific article

My contribution to the scientific article consisted of the elaboration of the research project, participation in the collection of data at T2, played an active role in the statistical analyses, interpretation of the results, and wrote the scientific manuscript. Audrey-Ann Journault was implicated in the acquisition of funding, elaboration of the project, data collection, data curation, and editing of the manuscript. Sandrine Charbonneau and Claudia Sauvageau were involved in data collection. Charles-Édouard Giguère carried out the statistical analyses and contributed to the writing of the results section of the manuscript. Sonia Lupien acquired funding, aided with the elaboration of the research project, interpretation of the results, and supervised all steps during the preparation of the manuscript. All authors read and approved the manuscript.

When talking goes awry: Association between co-rumination and different forms of normative anxiety in children and adolescents

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Declarations of interest: none.

Abstract

Introduction: Social support from a friend can help us when we face problems. However, this support may lead to co-rumination if the problem is discussed exhaustively and there is a focus on negative feelings. To this day, co-rumination has been associated with anxiety symptoms and clinical forms of anxiety. However, few studies have investigated the association between co-rumination and forms of normative anxiety such as state anxiety, trait anxiety, test anxiety, and anxiety sensitivity. The objective of this study was to assess the relationship between co-rumination and these four forms of normative anxiety. *Methods:* In this cross-sectional exploratory study, a total of 1204 (58.9% girls) Canadian sixth grade children (ages 11-12) and 11th grade adolescents (ages 16-17) completed questionnaires measuring co-rumination and state anxiety, trait anxiety, test anxiety, and anxiety sensitivity. *Results:* Co-rumination was associated with anxiety sensitivity in children and with trait anxiety, test anxiety, and anxiety sensitivity in adolescents. *Conclusions:* Developmental factors may play a role in the association between co-rumination and different forms of normative anxiety. Anxiety sensitivity may be sensitive to co-rumination in childhood and may broaden to trait and test anxiety in adolescence. These results deepen our understanding of the relationship between co-rumination and normative anxiety and generate hypotheses for future confirmatory studies.

Key words: co-rumination; normative anxiety; children; adolescents

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Introduction

Beginning at a young age, friendships play an important role in our lives (Rubin et al., 2006). Friends can act as a source of social support and help us in times of need (van der Horst & Coffé, 2012). However, this social support may lead to co-rumination, where a dyad discusses a problem repeatedly and exhaustively while focusing on the causes of a problem, its consequences, and the associated negative feelings (Rose, 2002). Co-rumination has positive and negative characteristics which may be attributable to its elements of intense self-disclosure and extensive focus on negative feelings, respectively (Rose, 2002). Thus, co-rumination has been associated with both positive friendship quality (Rose et al., 2007) and anxiety (Spendelow et al., 2017).

Anxiety can be described on a continuum (Muris, 2007) where it can be either an adaptive/normal emotion that helps us avoid threats or a clinical disorder (Beesdo et al., 2009). Throughout life, it is common for individuals to experience feelings of anxiety that are specific to their age group and/or to stressful life periods. These forms of anxiety are considered normative and are distinct from clinical anxiety disorders (Craske & Stein, 2016). Four forms of normative anxiety have been extensively studied and include state anxiety (Spielberger, 1966), trait anxiety (Spielberger, 1966), test anxiety (Spielberger & Vagg, 1995), and anxiety sensitivity (Reiss et al., 1986).

State anxiety is a temporary emotion provoked by a threatening situation and can elicit tension, nervousness, worry, apprehension, and physiological arousal (Spielberger, 1972). In contrast, trait anxiety is a stable personality trait that predisposes an individual to experience anxiety when faced with a threatening situation (Spielberger, 1972). Test anxiety is specific to evaluation situations and manifests itself through thoughts (thoughts of worry during the evaluation), autonomic reactions (bodily responses such as sweating), and off-task behaviours (behaviour that is unrelated to the evaluation itself; Wren & Benson, 2004). Finally, anxiety sensitivity is a fear of one's physiological sensations of anxiety (sweating, racing heart, etc.) and is characterized by the individual's belief that these sensations will have negative physical, psychological, and/or social consequences (McNally, 1990; Reiss et al., 1986).

Although scientists have described these four forms of normative anxiety over the last few decades, most studies assessing the relationship between co-rumination and anxiety have used

a wide variety of other anxiety measures (ranging from measures of anxiety symptoms to measures based on clinical forms of anxiety [see Appendix 1]). Here, most studies revealed positive associations between co-rumination and anxiety. However, Starr and Davila (2009) and Griffiths (2017) highlighted the importance of studying the relationship between co-rumination and other different forms of anxiety to delve deeper into understanding how each form relates to co-rumination specifically. Yet, to this day, only two studies to our knowledge have measured forms of normative anxiety and their association with co-rumination. First, a study in a sample of 85 adults (45 undergraduate students and 40 individuals from the community) revealed that greater co-rumination was associated with greater state anxiety (Keshishian et al., 2016). Second, a study conducted with 441 undergraduate students found a positive association between co-rumination and trait anxiety (Doyle, 2013). To our knowledge, no studies have investigated the relationship between co-rumination and test anxiety, nor between co-rumination and anxiety sensitivity.

To better understand the relationship between co-rumination and normative anxiety, sex and age are two important factors to consider. Indeed, studies have revealed that girls co-ruminate more (Rose, 2002; Tompkins et al., 2011) and present greater levels of various forms of anxiety (Carter et al., 2011; Lau et al., 2006; Lewinsohn et al., 1998) than boys. Other studies show that adolescents co-ruminate more than children (Hankin et al., 2010; Stone et al., 2011). In addition, a recent study with children and adolescents reported that although similar levels of anxiety sensitivity were observed in both age groups, adolescents presented higher state, trait, and test anxiety levels than children (Journault et al., 2021).

Taken together, these studies suggest that co-rumination may be associated with different forms of normative anxiety as a function of sex and/or age, although it is not clear whether this association differs as a function of the form of normative anxiety measured. The objective of the current exploratory study was to investigate the relationship between co-rumination and different forms of normative anxiety, while considering sex and age.

According to Gaus et al. (2015), exploratory studies aim to investigate a research domain without a pre-determined hypothesis and consequently, serve to generate new hypotheses. Therefore,

the current study aimed to measure the association between co-rumination and forms of normative anxiety in children and adolescents to generate new hypotheses on how tendencies to co-ruminate, which may differ as a function of sex and age, may be differentially associated with state anxiety, trait anxiety, test anxiety, and/or anxiety sensitivity.

Methods

Methodological context

In May 2019, a large study conducted by Journault et al. (2021) at our research laboratory sought out to investigate different predictors of normative anxiety (state, trait, test anxiety, and anxiety sensitivity) in children and adolescents living in the province of Quebec, Canada. We took advantage of this ongoing investigation to develop an exploratory study to assess the relationship between co-rumination and normative anxiety. To do so, we submitted an addendum to the ethics committee of the Institut universitaire en santé mentale de Montréal to obtain permission to incorporate a co-rumination questionnaire into the ongoing anxiety study. Thus, data for this paper was collected during the second data measurement time period of the large study (October and November 2019). All data was obtained from the study of Journault et al. (2021). The addendum to integrate a co-rumination questionnaire into the larger study received ethics approval from the Research Ethics Board of the Centre intégré universitaire de santé et de services sociaux (CIUSSS) de l'Est de l'Île de Montréal on September 25th, 2019.

Disclosure

This project was preregistered on the Open Science Framework on January 16th, 2020. The preregistration and database associated with the results presented in this paper can be accessed using the following DOIs: 10.17605/OSF.IO/B2UJ7 and 10.17605/OSF.IO/CR8XT respectively. For more information on the larger study, the preregistration can be accessed at the following DOIs: 10.17605/OSF.IO/35UZ9 (published on August 15th, 2019) and 10.17605/OSF.IO/U3K7C (published on December 16th, 2019).

Participants

The study sample consisted of 1204 students from Grades 6 (ages 11-12) and 11 (ages 16-17) from seven elementary and six high schools on the north shore of the island of Montreal in Quebec, Canada. All participants were fluent in French.

All students from each school were invited to participate in the study, though parental consent was required for children. Parental consent was obtained for children before the data collection itself and consent for adolescents was obtained in person with the research team before data collection.

Measures

Co-rumination

To measure co-rumination with friends, we used an adapted 9-item version of the original 27-item The Co-rumination Questionnaire (Rose, 2002). Items of the shortened version of the questionnaire were identified via a thesis written by Arroyo (2013). Each item in the questionnaire was rated on a scale ranging from 1 ("Not at all true") to 5 ("Really true"), where participants' total scores varied from 9 to 45. Overall co-rumination scores were calculated via the mean ratings of the items in the questionnaire, where a higher score indicated greater co-rumination. Compared to the reliability of the original 27-item version (α=.96; Rose, 2002), the short 9-item version had excellent reliability (α= .91; Arroyo, 2013). Davidson et al. (2014) found a positive and significant correlation between scores on the original questionnaire and observational co-rumination data, indicating the validity of the questionnaire. Our research team used a double-blind translation technique to translate the questionnaire from English to French. Within our sample, we obtained a Cronbach's α of .87.

State and trait anxiety

The French version of the State-Trait Anxiety Inventory for Children (STAI-C; Spielberger et al., 1983), translated and validated by Turgeon and Chartrand (2003), was used to measure state and trait anxiety. The STAI-C consisted of two subscales with 20 questions in each. The state subscale measured momentary anxiety by asking how the participant felt while completing the

questionnaire. Items were rated on a scale of 1 ("Very [Emotion]"), 2 ("[Emotion]") to 3 ("Not [Emotion]"). The trait subscale measured anxiety as a personality trait and asked the participant how they feel in general. Items were rated on a scale ranging from 1 ("Hardly ever"), 2 ("Sometimes") to 3 ("Often"). Participant scores varied from 20 to 60 for both subscales, where a higher score indicated higher state/trait anxiety. The reported reliability of the STAI-C is .88 for state anxiety and .89 for trait anxiety (Turgeon & Chartrand, 2003). Within our sample, we obtained Cronbach's α values of .90 and .89 for state and trait anxiety, respectively.

Test anxiety

The 25-item Children's Test Anxiety Scale (CTAS; Wren & Benson, 2004) was used to measure test anxiety. Participants were instructed to answer the questions while reflecting on how they behave during an evaluation and the emotions they feel. Items were rated on a scale of 1 ("Almost never") to 4 ("Almost always"). Participants' total scores varied from 25 to 100, where a higher score indicated higher test anxiety. The reported reliability of the CTAS is .89 (Wren & Benson, 2004). Our research team used a double-blind translation technique to translate the original questionnaire from English to French. Within our sample, we obtained a Cronbach's α of .93.

Anxiety sensitivity

The French version of the Childhood Anxiety Sensitivity Index (CASI; Silverman et al., 1991; Stassart & Etienne, 2014) was used to measure anxiety sensitivity. This index contained 18 items. Participants responded in one of three ways: "not at all", "a little" or "a lot". Total scores varied from 18 to 54, where a higher overall score indicated greater anxiety sensitivity. The reliability of the French version of the CASI is .82 (Stassart & Etienne, 2014). Within our sample, we obtained a Cronbach's α of .89.

Procedure

Testing for all schools began in October 2019 and ended in early November 2019. All testing occurred during class time with the aid of research assistants and/or the second author of this paper. In their classrooms, participants completed all self-report measures online via the Studies Web Automation Tool (SWAT), a secure platform developed by our laboratory. All participating

schools used this online method to complete the questionnaires, except for one school that used pencil and paper questionnaires due to technical issues.

Statistical analyses

Preliminary analyses

Our objective was to investigate the association between co-rumination and four different forms of normative anxiety in children and adolescents, where the range of the four anxiety scales vary greatly. To compare the associations, scores on each of the anxiety measures were transformed to a common scale of 0 to 1. The transformations were performed using a method used by Carey et al. (2017) by subtracting the minimal theoretical value (min) and multiplying by $\frac{1}{(\max - \min)}$.

To confirm the sex and age differences found in the co-rumination literature, preliminary analyses with mean comparisons using a linear mixed-effect model were performed to investigate whether co-rumination varied across sex (girls and boys) and age (children and adolescents). To confirm the age differences in the anxiety literature, preliminary analyses with four mean comparisons adjusted for a false discovery rate were performed. For all preliminary analyses, a random intercept on classroom was added to account for the effect that anxiety inside the classroom may have on each individual's anxiety. If an effect of sex was found for co-rumination, this variable was adjusted for in our main analyses. Given that the number of adolescents in our sample (n=917) far outweighed the number of children (n=287), the age groups were analysed separately.

Main analyses

To test if co-rumination was associated with the four forms of anxiety, we used a linear mixed-effect model. This model allowed us to include the four forms of anxiety simultaneously (state anxiety, trait anxiety, test anxiety, and anxiety sensitivity). It also allowed us to add a random intercept by classroom. First, we tested the association between co-rumination and anxiety and if it was statistically significant, we verified whether the association varied across sex. As we tested associations across four forms of anxiety, a false discovery rate was used to adjust p-values. Finally, Bayes factors were used to explore the evidential values of nonsignificant findings (Dienes,

2014, 2016). Analyses were done using R (R Core Team, 2020) and package lme4 (Bates et al., 2015). Omega squared (ω^2) was used as the effect size (Olejnik & Algina, 2003) to measure the strength of the significant associations between co-rumination and normative anxiety, and were interpreted according to guidelines featured in Table 1 (Kirk, 1996).

Value of ω^2	Magnitude
.010	Small
.059	Medium
.138	Large

Table 1. – Guidelines Proposed by Kirk (1996) to Evaluate the Magnitude of the Strength of an Association Using ω^2

Results

Descriptives

Sample characteristics are displayed in Table 2. Co-rumination and normative anxiety scores are presented in Table 3. Finally, correlations between all dependent measures in children and adolescents are featured in Table 4 and 5, respectively.

	Children	Adolescents	Full sample
Participants	287	917	1204
Sex	278	914	1192
Girl	159 (55.4%)	550 (60.0%)	709 (58.9%)
Boy	119 (41.5%)	364 (39.7%)	483 (40.1%)
Missing	9 (3.1%)	3 (0.3%)	12 (1.0%)
Origins	204	205	409
White	148	172	320
Indigenous nations	3	2	5
Middle easterner	1	1	2
Asian	1	2	3
Black	2	0	2
Central and South America	4	6	10
Other	45	22	67
Missing	83	712	795
Socioeconomic status[a]	189	199	388
0 - 25 000$	2	3	5
25 000 - 50 000$	15	14	29
50 000 - 75 000$	18	20	38
75 000 - 100 000$	31	35	66
100 000 - 125 000$	28	53	81
125 000 - 150 000$	33	7	40
150 000$ and over	62	67	129
Missing	98	718	816

[a]Household family income in Canadian dollars (as reported by parents) was used as an indicator of participant socioeconomic status.

Table 2. – Sociodemographic Characteristics of the Sample

	Children				Adolescents			
	n	*M (SD)*	*Range*	*Scaled mean (SD)*	*n*	*M (SD)*	*Range*	*Scaled mean (SD)*
Co-rumination	268	28.44 (7.82)	9-45		856	31.14 (6.68)	9-45	
State anxiety	280	30.33 (6.60)	20-59	0.26 (0.16)	892	33.52 (6.53)	20-60	0.34 (0.16)
Trait anxiety	282	35.24 (8.74)	20-59	0.38 (0.22)	904	38.21 (8.13)	20-60	0.46 (0.20)
Test anxiety	285	50.64 (16.53)	25-97	0.34 (0.22)	900	56.51 (15.02)	25-100	0.42 (0.20)
Anxiety sensitivity	280	29.43 (7.73)	18-52	0.32 (0.21)	894	30.16 (7.30)	18-54	0.34 (0.20)

Table 3. – Descriptive Statistics for Continuous Variables

	1	2	3	4
1. State anxiety	–			
2. Trait anxiety	.64*	–		
3. Test anxiety	.55*	.75*	–	
4. Anxiety sensitivity	.54*	.75*	.68*	–

*$p < .01$

Table 4. – Correlations for Dependent Variables in Children

	1	2	3	4
1. State anxiety	–			
2. Trait anxiety	.63*	–		
3. Test anxiety	.51*	.71*	–	
4. Anxiety sensitivity	.45*	.66*	.59*	–

*$p < .01$

Table 5. – Correlations for Dependent Variables in Adolescents

Preliminary analyses

Preliminary results revealed that girls (M=31.42, SD=6.77) co-ruminated more than boys (M=29.00, SD=7.26; β=2.45, p<.001) and adolescents co-ruminated more than children (β=2.65, p<.001). Furthermore, adolescents scored higher on state anxiety (β=.08, p<.001), trait anxiety (β=.08, p<.001), and test anxiety (β=.08, p<.001) when compared to children, while levels of anxiety sensitivity did not differ statistically across age groups (p=.24).

Association between co-rumination and normative anxiety in children

For children, the association between co-rumination and anxiety was found to be statistically significant for anxiety sensitivity (β=.005, p=.003, ω^2=.03) but not for state anxiety (β=-.0004; p=.82), trait anxiety (β=.003; p=.13), nor test anxiety (β=.003; p=.13) as shown in Table 4. A beta of .005 implies that when co-rumination increased by 10 units (where co-rumination ranged from 9-45), anxiety increased by .05 units on the scale of 0 to 1 unit. This indicated that between the

minimal and maximal (36 units) values on co-rumination, anxiety will increase by .18 units. The 95% confidence intervals of the betas are presented in Figure 2.

As the association between co-rumination and anxiety sensitivity was significant, we verified whether it varied across sex. We found that the association did not vary across sex (p=.73).

Form of anxiety	Effect	Estimate	*SE*	df	*t*	P(>|t|)
Anxiety sensitivity (intercept)	**$\beta_{co\text{-}rumination}$**	**.005**	**.002**	**461.01**	**3.36**	**.003**
Test anxiety	$\beta_{co\text{-}rumination}$	.003	.002	459.56	1.65	.13
State anxiety	$\beta_{co\text{-}rumination}$	-.0004	.002	466.04	-0.22	.82
Trait anxiety	$\beta_{co\text{-}rumination}$	.003	.002	460.17	1.77	.13

Note. Model was adjusted for sex. Bold rows identify statistically significant slope for the association between co-rumination and anxiety (p-values were adjusted for a false discovery rate).

Table 6. – Linear Mixed-Effects Model of Co-rumination on Form of Anxiety for Children

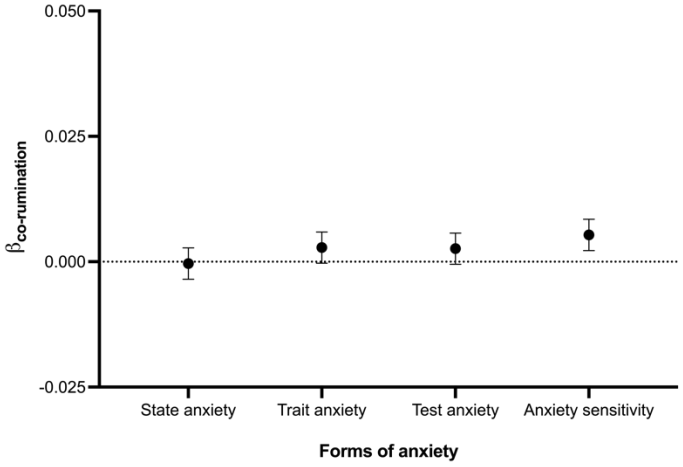

Figure 2. – Confidence Intervals (95%) of the Coefficients of the Association Between Co-rumination and Anxiety for Children

Association between co-rumination and normative anxiety in adolescents

For adolescents, the association between co-rumination and anxiety was found to be statistically significant for trait anxiety (β=.003; p=.002; ω^2=.01), test anxiety (β=.002; p=.029; ω^2=.01), and anxiety sensitivity (β=.004; p<.001; ω^2=.02), but not for state anxiety (β=-.001; p=.25) as shown in Table 5. A beta of .004 implies that when co-rumination increased by 10 units (co-rumination ranged from 9-45), anxiety increased by .04 units on the scale of 0 to 1 unit. This means that between the minimal and maximal (36 units) values on co-rumination, anxiety will increase by .14 units. The 95% confidence intervals of the betas are presented in Figure 3.

As co-rumination was significantly associated with trait anxiety, test anxiety, and anxiety sensitivity, we verified whether the associations varied across sex. We found that the associations did not vary across sex (p=.18).

Form of anxiety	Effect	Estimate	*SE*	df	*t*	P(>|t|)
Anxiety sensitivity (intercept)	**$\beta_{co\text{-}rumination}$**	**.004**	**.001**	**1651.41**	**4.56**	**<.001**
Test anxiety	**$\beta_{co\text{-}rumination}$**	**.002**	**.001**	**1643.77**	**2.30**	**.029**
State anxiety	$\beta_{co\text{-}rumination}$	-.001	.001	1665.16	-1.16	.25
Trait anxiety	**$\beta_{co\text{-}rumination}$**	**.003**	**.001**	**1641.54**	**3.34**	**.002**

Note. Model was adjusted for sex. Bold rows identify statistically significant slope for the association between co-rumination and anxiety (p-values were adjusted for a false discovery rate).

Table 7. – Linear Mixed-Effects Model of Co-rumination on Form of Anxiety for Adolescents

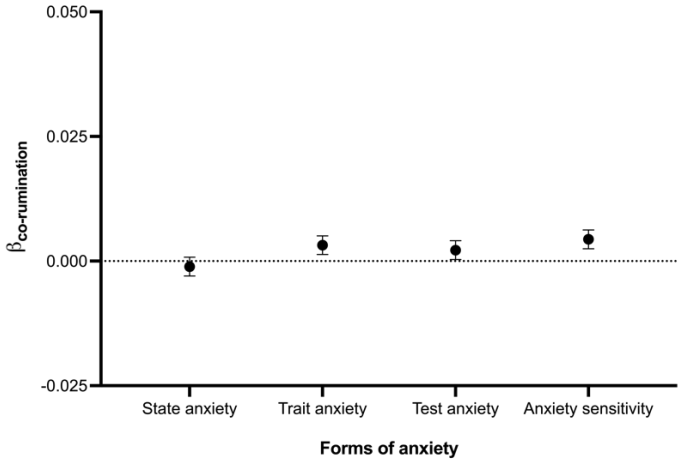

Figure 3. – Confidence Intervals (95%) of the Coefficients of the Association Between Co-rumination and Anxiety for Adolescents

Evidential value of null results using Bayes factors

We obtained nonsignificant associations between co-rumination and forms of normative anxiety for both children (state, trait, and test anxiety) and adolescents (state anxiety). Nonsignificant results can be attributable to the absence of an effect (or association) or insufficient statistical power to detect an effect (or association; Aczel et al., 2018; Dienes, 2014). To decipher the origin of nonsignificant findings, Bayes factors can be used to determine whether a study's dataset favours either the null (H_0= no association exists) or alternative hypothesis (H_1= an association exists; Beard et al., 2016). To estimate Bayes factors, we calculated the Bayesian information criteria (BIC_{10}; Jarosz & Wiley, 2014) using R software (see Table 6).

Although Bayes factors are typically reported to interpret nonsignificant findings, the effect size of the significant associations between co-rumination and normative anxiety for children (anxiety sensitivity) and adolescents (trait anxiety, test anxiety, and anxiety sensitivity) were small (ranging from ω^2=.01 to ω^2=.03; see Table 1). Thus, the Bayes factors for our significant findings are also featured in Table 6 to provide weight to our later interpretations. The obtained values were interpreted according to guidelines featured in the literature (Beard et al., 2016).

Children			
	Form of anxiety	Bayes factor	Interpretation
	State anxiety	0.06	Strong evidence in favour of H_0
	Trait anxiety	0.17	Moderate evidence in favour of H_0
	Test anxiety	0.17	Moderate evidence in favour of H_0
	Anxiety sensitivity	4.22	Moderate evidence in favour of H_1
Adolescents			
	State anxiety	0.07	Strong evidence in favour of H_0
	Trait anxiety	2.00	Anecdotal evidence in favour of H_1
	Test anxiety	0.70	Anecdotal evidence in favour of H_0
	Anxiety sensitivity	239.3	Extreme evidence in favour of H_1

Table 8. – Bayes Factor for the Association Between Co-Rumination and Different Forms of Normative Anxiety in Children and Adolescents

Discussion

The objective of this study was to investigate the association between co-rumination and four different forms of normative anxiety (state, trait, test anxiety, and anxiety sensitivity) in children and adolescents, while considering sex and age. We found that in children, only one form of normative anxiety (anxiety sensitivity) was significantly associated with co-rumination and co-rumination was associated with three out of four forms of anxiety (trait anxiety, test anxiety, and anxiety sensitivity) in adolescents. We also reported that these associations did not differ across sex.

As co-rumination was associated with one form of normative anxiety in children but three forms in adolescents, factors throughout development may be at play. First, the amount of time spent with parents is higher in children (ages 10 to 13) compared to adolescents (ages 14 to 15; Baxter, 2018) and parents are the most important caretaker for a child (Åman-Back & Björkqvist, 2004). As we measured co-rumination with friends, this may explain why co-rumination was associated with fewer forms of normative anxiety in children compared to adolescents. Second, parental presence has been shown to have protective effects. For example, parental support has been

found to buffer the body's physiological response to a stressor for children ages 9 to 10 (Hostinar et al., 2015). This phenomenon is referred to as parental social buffering (Gunnar et al., 2015). Third, studies have alluded to the key role friends play in the association between co-rumination and internalizing symptoms (anxiety and depression) as opposed to parents. According to youth reports, a study in fifth, eighth, and 11th graders found that co-rumination between mother and child about the mother's problems, but not about the youth's problems, was associated with greater internalizing symptoms in the child (Waller & Rose, 2010). As co-rumination with mothers was not consistently associated with internalizing symptoms (in contrast to co-ruminating with friends), Waller and Rose (2010) proposed that co-rumination with mothers may be more constructive (focus on solutions) than with friends. Waller and Rose (2013) took the findings of Waller and Rose (2010) one step further by controlling for co-rumination with friends. When doing so, the association between mother-child co-rumination and internalizing symptoms was nonsignificant and led the authors to suggest the risker nature of co-ruminating with friends compared to mothers (Waller & Rose, 2013). Similar conclusions were drawn by authors of a study in 400 students (ages 11 to 14) investigating co-rumination with mothers and fathers, and prospective internalizing symptoms (Ioffe et al., 2020). Although the ages in the aforementioned studies were mainly older than the children in our study, their findings provide insight about the role that friendship plays on the association between co-rumination and internalizing symptoms. To conclude, these studies demonstrate the presence and potential protective function of parents for children, as well as the notable role of friends in the association between co-rumination and internalizing symptoms. Together, this evidence provides insight into our findings that co-rumination was only associated with one form of normative anxiety in childhood.

Second, adolescents spend less time with their parents as friends become increasingly more important in their lives (Bornstein et al., 2013). Parents become less important providers of intimate self-disclosure (Buhrmester & Furman, 1987) and the parental social buffer diminishes with puberty (Gunnar, 2017). Despite this change, parental social buffering does not seem to have shifted over to friends by the age of 15 to 16, as support from a friend amplified the body's physiological response to a stressor compared to parental support (Doom et al., 2017). Nonetheless, intimate disclosure with friends is a hallmark of adolescent friendships which may

lead to lengthy discussions about problems (Rubin et al., 2006) and possibly co-rumination. Of note, co-ruminating with friends has been associated with prospective increases in internalizing symptoms (Hankin et al., 2010; Rose et al., 2007). Moreover, Stone et al. (2017) found that supportive maternal responses to their child's (ages 9 to 17) distress and support seeking was positively associated with adolescents' tendency to co-ruminate with peers. The authors noted that type of parental support may explain their findings. For instance, parental support may need to consist of constructive coping strategies (in times of distress) and consistent parental support (i.e., provided to a child regardless of their distress levels) to discourage co-rumination with peers (Stone et al., 2017). Therefore, parent-child relationships that lack these characteristics may have negative repercussions for how adolescents regulate their distress with peers. Together, these studies suggest that adolescents may be more vulnerable without the protective function of their parents and that co-rumination during this period may occur within friendships and from parental socialization. To gain a better understanding of the principal motivators behind an adolescent's tendency to co-ruminate, future studies could compare friend and parental influences directly.

Third, digital technology may have influenced the different associations between co-rumination and forms of normative anxiety observed in children and adolescents. According to a recent census, children (ages 8 to 12) spend a daily average of 10 minutes on social media compared to more than one hour for adolescents (ages 13 to 18; Rideout & Robb, 2019). Furthermore, 78% of adolescents text in a day, where texters can send an average of 39 texts per day (Rideout & Robb, 2019). These findings indicate the increased presence of technology during adolescence. Moreover, a study in eighth grade students found that although co-rumination is more frequent in person, it was also observed across several modalities (i.e., texting, phone, social media), suggesting that technology provides more opportunities to co-ruminate (Battaglini et al., 2021). More time spent co-ruminating on social media also predicted more co-rumination in person (Battaglini et al., 2021). Furthermore, a longitudinal study in seventh and eighth grade students found that co-rumination was a significant mediator of the relationship between social media use and anxiety (Ohannessian et al., 2021). These studies give meaning to our findings that co-rumination was associated with several forms of normative anxiety in adolescents, as this age group have increasing opportunities to co-ruminate (via technology) that are coupled with

increases in anxiety. Using the methodology of Ohannessian et al. (2021), future research could verify the mediating role of co-rumination on the relationship between social media and measures of normative anxiety used in the current study.

Our findings provide two interesting perspectives on how the relationship between co-rumination and normative anxiety evolve across development. First, anxiety sensitivity is the only form of normative anxiety (out of the four forms tested) that was associated with co-rumination in both age groups. Our Bayes factor analyses also revealed moderate (for children) and extreme (for adolescents) evidence in favour of the association between co-rumination and anxiety sensitivity. This suggests that anxiety sensitivity may be particularly sensitive to co-rumination from an early age. Thus, co-rumination interventions should perhaps target anxiety sensitivity during childhood, which in turn may mitigate the strength of this association in adolescence. Second, the association between co-rumination and anxiety sensitivity in childhood may broaden to other forms of normative anxiety in adolescence, namely to trait and test anxiety. This suggests that certain occurrences in the lives of adolescents (e.g., increasing importance of friendships, parental socialization, and technology) may engender relationships between co-rumination and additional forms of normative anxiety. Collectively, this led us to generate the hypotheses that co-rumination is associated with anxiety sensitivity in young individuals (particularly in adolescence) and that the relationship between co-rumination and normative anxiety evolves across development. Future confirmatory studies should test these hypotheses.

For both children and adolescents, we found that the associations between co-rumination and forms of normative anxiety did not vary across sex. The literature contains mixed findings on this subject. In accordance with our results, the impact of co-rumination may be similar across sexes, despite the fact that girls co-ruminate more than boys (Spendelow et al., 2017). However, Spendelow et al. (2017) recognized that their review was based on data largely stemming from studies investigating the relationship between co-rumination and depression. Contrary to our findings, a study revealed that the relationship between co-rumination and anxiety was different for girls and boys (Rose et al., 2007). To elucidate the literature and to contribute to the minimal findings on co-rumination and normative anxiety, studies should examine the role of sex and/or gender factors on this association.

According to guidelines proposed by Kirk (1996), the strength of the association between co-rumination and anxiety sensitivity in children hovered between small and medium, whereas the associations between co-rumination and trait anxiety, test anxiety, and anxiety sensitivity in adolescents were small. Our small effect sizes align with the literature. In their review of 38 studies, Spendelow et al. (2017) reported small to medium effect sizes for the relationship between co-rumination and internalizing symptoms. Further, a review by Griffiths (2017) reported small to medium effect sizes for studies investigating co-rumination and anxiety specifically. As the co-rumination literature seems to have focused primarily on its association with depression, future studies should continue to study various forms of normative anxiety to further understand the strength of its relationship with co-rumination.

This study had several limitations. First, and as discussed above, the effect sizes for the associations between co-rumination and anxiety were small. It is important to recognize that these associations exist within complex organisms and that studying additional factors may help to improve our understanding of this relationship. Second, we used an adapted 9-item version of the original 27-item The Co-rumination Questionnaire (Rose, 2002). With that said, when comparing effect sizes using both the original and shortened versions, Spendelow et al. (2017) concluded that the original version produced only slightly larger effect sizes than shorter versions of the questionnaire. Be this as it may, it will be important for future studies to replicate our findings using the original questionnaire. Third, we used self-report measures to quantify co-rumination and anxiety. A vital contribution to the literature would be to replicate our findings using laboratory-induced co-rumination (Byrd-Craven et al., 2008; Rankin et al., 2018), where a dyad is asked to discuss their current personal problems for 16 minutes (Rose et al., 2014). Fourth, there may have been a recruitment bias in this study as a small number of parents consented for their children to participate. Participating students may have been more anxious than those who did not participate. In contrast, a large majority of the invited 11th grade adolescents accepted to participate and therefore, it is possible that we did not have the same recruitment bias as for children. However, it remains that our sample was from a select few schools near the island of Montreal which may not be representative of individuals elsewhere. Lastly, as this study was conducted in a general sample of children and adolescents, future studies could examine whether

disorders within different sub-groups of the population influence the strength of the association between co-rumination and forms of normative anxiety.

Conclusion

In conclusion, the current exploratory study investigated co-rumination and various forms of normative anxiety in children and adolescents. Our overall findings revealed that the relationship between co-rumination and anxiety appears to begin early with anxiety sensitivity being the first form of normative anxiety to be associated with co-rumination. This association then broadens to trait and test anxiety in adolescence. As we did not follow children across development into adolescence, longitudinal studies are required to confirm the evolution of the relationship between co-rumination and normative forms of anxiety within an individual. Positive results from such longitudinal studies could help us develop targeted interventions to educate children to choose healthier alternatives to co-rumination and potentially mitigate the evolution of co-rumination and normative anxiety into adolescence.

Chapter 3 – Discussion

Summary of findings

The objective of this study was to investigate the association between co-rumination and different forms of normative anxiety in children and adolescents (while considering sex and age) to generate new hypotheses on how co-rumination may be differentially associated with state anxiety, trait anxiety, test anxiety, and/or anxiety sensitivity. While controlling for sex, we found that co-rumination was associated with anxiety sensitivity in children and with trait anxiety, test anxiety, and anxiety sensitivity in adolescents. When explored further, these associations did not differ across sex. From our results, we generated two hypotheses that could be tested by future confirmatory studies: 1) co-rumination is associated with anxiety sensitivity in young individuals (particularly in adolescence) and 2) the association between co-rumination and normative anxiety evolves across development.

This chapter will focus on topics that extend beyond those addressed in the discussion section of the scientific paper featured in Chapter 2. Additional research avenues will be proposed and possible considerations for future studies investigating the relationship between co-rumination and normative anxiety.

Potential mechanisms underlying the association between co-rumination and normative anxiety

Stress hormones

Given our findings that co-rumination was associated with anxiety sensitivity in children and adolescents, several potential mechanisms may be underlying this association. The first potential mechanism involves stress hormones.

Anxiety involves an anticipated threat (Puleo et al., 2011), whereas stress occurs when faced with an immediate threat (Lupien et al., 2015). As the brain detects a threat in both cases, anxiety and stress elicit the same physiological stress response (Lupien, 2020). Stress can either be absolute,

threatening to everyone who faces the threat (e.g., tornado), or relative, interpreted as threatening by an individual (e.g., public speaking; Lupien et al., 2015).

With regards to relative stress, research has identified four situational characteristics that elicit a stress response (Dickerson & Kemeny, 2004; Mason, 1968), denoted as NUTS (Novelty, Unpredictability, Threatening to the ego, and Sense of low control; Lupien et al., 2013). Novelty arises when a situation or element of a situation is novel, unpredictability occurs when a situation is unpredictable, threat to the ego can occur when the personality is threatened by the situation, whereas a sense of low control happens when an individual has the perception of having little or no control over a situation (Lupien, 2020). Whether stress is absolute or relative, the body will produce the same physiological stress response accompanied by physiological manifestations (e.g., muscle tension, increased blood pressure; Lupien, 2020).

As described by Lupien et al. (2015), when the brain detects a threat in the environment, the hypothalamic-pituitary-adrenal axis (HPA) is activated and will eventually lead to the release of stress hormones. To do so, the HPA axis will trigger a hormonal cascade in the brain and body. Within the brain, the hypothalamus will release corticotropin-releasing hormone (CRH), resulting in the release of adrenocorticotropin (ACTH) from the pituitary gland. ACTH will travel through the bloodstream to the adrenal glands, located superior to the kidneys. Subsequently, the adrenal cortex of the adrenal glands will release cortisol, the principal stress hormone in humans. A common method of quantifying cortisol levels is via saliva samples (Lupien et al., 2015).

Stress hormones may be a potential mechanism linking co-rumination and anxiety sensitivity. First, co-rumination may lead to anxiety sensitivity through the production of cortisol. This is supported by the Byrd-Craven et al. (2008) study which demonstrated that co-rumination can increase cortisol in women. As described in Chapter 1, co-rumination can be induced in a laboratory setting where dyads generate a list of current problems and are later asked to discuss these problems with their friend (Rose et al., 2014). In their study, Byrd-Craven et al. (2008) randomly assigned 24 adult women friendship dyads to the problem talk condition (where a generated problem to encourage co-rumination was discussed) or control condition (where participants were instructed to design a recreation centre). Dyads were asked to discuss within

their respective conditions for 17 minutes (in contrast to Rose et al. (2014) where the dyads discussed problems for 16 minutes) and salivary cortisol was collected throughout the study protocol. Beyond showing that women dyads co-ruminated more in the problem talk condition compared to the control condition, the results showed that co-rumination in the problem talk condition was associated with an increase in cortisol following the task (Byrd-Craven et al., 2008). In addition, the study investigated whether certain aspects of co-rumination (e.g., dwelling on negative feelings, rehashing) were particularly associated with cortisol levels following co-rumination. Notably, it was observed that dwelling on negative feelings significantly predicted cortisol levels after the task in the problem talk condition only. From this, the authors suggested that dwelling on negative feelings may be the most stressful aspect of co-rumination, whereas other aspects could be considered more analytical (e.g., speculation about problems; Byrd-Craven et al., 2008). Taken together, the stress response triggered by co-rumination may lead an individual to experience anxiety sensitivity about their bodily reactions to stress, as its physiological manifestations are similar to that of anxiety (e.g., increase in blood pressure, muscle tension; Bystritsky & Kronemyer, 2014). If this is the case, this would present interesting ties with our first hypothesis that co-rumination is associated with anxiety sensitivity in young individuals (particularly in adolescence). Although children may respond with anxiety sensitivity when faced with a stress response following co-rumination, adolescents may be particularly sensitive to their physiological reactions.

On the other hand, anxiety sensitivity may also lead to co-rumination through the production of stress hormones. Anxiety sensitivity contains several of the NUTS characteristics. For example, individuals with anxiety sensitivity are afraid of the physiological, psychological, and social consequences that may arise from their anxiety sensations (Reiss et al., 1986), which aligns with the notion of threatening to the ego. Furthermore, anxiety sensitivity includes a fear of losing control over their emotions (Reiss et al., 1986), denoting a sense of low control. Finally, a study found a positive significant correlation between intolerance to uncertainty and anxiety sensitivity (Carleton et al., 2007), referring to the unpredictability characteristic. From this, anxiety sensitivity could lead to an increase in stress hormones. Although no studies have explored whether stress hormones lead to co-rumination, this is a plausible mechanism as cortisol is a

liposoluble hormone that can easily cross the blood-brain barrier and access brain regions involved in learning and memory, such as the amygdala, hippocampus (Herman et al., 2005), and frontal lobe (Diorio et al., 1993; for a review see Lupien et al., 2007). As the amygdala is involved in threat detection (Bishop, 2008), this may foster co-rumination as problems may be seen as threats. In summary, if anxiety sensitivity triggers a stress response, this increase in cortisol may trigger co-rumination with a friend. Future studies could test these possibilities by exposing two groups of participants (with low and high self-reported anxiety sensitivity) to a psychosocial laboratory stressor (such as the Trier Social Stress Test [TSST]; Kirschbaum et al., 1993) and two additional groups of participants (with low and high anxiety sensitivity) to a control task. Thereafter, all participants would be asked to discuss a personal problem and their interactions would be coded for co-rumination. The two control groups would be compared to determine whether anxiety sensitivity is associated with co-rumination. If the latter is found to be true, groups exposed to the TSST would be compared to determine whether anxiety sensitivity leads to co-rumination through the production of stress hormones.

Adrenocortical attunement

Co-rumination can revolve around one or both dyad members' problem(s). Therefore, a co-rumination session may focus solely on one member's problems. This raises the question as to whether the role of stress hormones in the association between co-rumination and anxiety sensitivity is maintained when only one dyad's problems are discussed. This may be possible through adrenocortical attunement, which refers to the synchronization of cortisol levels within a dyad (Rankin et al., 2018).

To examine the phenomenon of adrenocortical attunement, a study by Rankin et al. (2018) investigated whether the cortisol responses following co-rumination could synchronize across dyad members. The sample included 37 women friendship dyads and used a protocol similar to that used by Byrd-Craven et al. (2008). Dyads in the problem talk condition were allowed to discuss one or both dyad members' problems. Results revealed that, regardless of the experimental condition, co-rumination increased adrenocortical attunement (Rankin et al., 2018). The authors suggested that attunement may be beneficial for bonding within friendships but that future research is required to better understand the implications of this attunement (Rankin et

al., 2018). This study brings attention to the idea that discussing either one of the dyad member's problems (or both) is associated with synchronization of stress responses. This suggests that the physiological repercussions of co-ruminating are not limited to the person facing the problem but can also be experienced by the other dyad member.

With regards to our findings, this suggests that regardless of whether one or both dyad's problems are discussed, co-rumination induced adrenocortical attunement could potentially lead both members to experience anxiety sensitivity about their physiological stress responses. However, our participants were asked to think about a problem in a general sense and not only a problem specific to them or their friend. Future studies should explore whether anxiety sensitivity could arise from adrenocortical attunement following co-rumination about one or both dyad members' problems.

Distress tolerance

Distress tolerance may be another potential mechanism underlying the association between co-rumination and trait anxiety, test anxiety, and anxiety sensitivity observed in our study.

The literature refers to distress tolerance as an individual's capacity to withstand both negative psychological and physical states (Lee et al., 2018; Simons & Gaher, 2005). It can be conceptualized based on how an individual tolerates and appraises distress, how consumed they become by their negative emotions, and their regulation efforts to avoid or mitigate distress (Simons & Gaher, 2005). For example, individuals with low distress tolerance believe distress is unbearable, unacceptable, are consumed by their negative emotions, and will go to great lengths to avoid these feelings (Simons & Gaher, 2005).

The relationship between distress tolerance and forms of normative anxiety has been previously documented in adults. Studies have found a negative correlation between distress tolerance and trait anxiety (Lee et al., 2018), suggesting that individuals with high trait anxiety have low distress tolerance. Moreover, as some overlap exists between test anxiety and distress tolerance, future studies could explore this potential association. For instance, the self-critical thoughts aspect of test anxiety shows overlap with items from the Distress Tolerance Scale (DTS), where responses to the scale range from strongly agree to strongly disagree (Simons & Gaher, 2005). Such items

include “My feelings of distress or being upset are not acceptable” and “Other people seem to be able to tolerate feeling distressed or upset better than I can” (Simons & Gaher, 2005). Furthermore, the off-task behaviours (e.g., distracting behaviours; Wren & Benson, 2004) in test anxiety resemble the following item from the DTS: “I’ll do anything to avoid feeling distressed or upset” (Simons & Gaher, 2005). Therefore, a negative association between test anxiety and distress tolerance may exist. Lastly, studies have found a negative correlation between distress tolerance and anxiety sensitivity (Allan et al., 2015; Laposa et al., 2015), suggesting that individuals with high anxiety sensitivity have low distress tolerance.

In addition to its association with different forms of normative anxiety, a link may also exist between distress tolerance and co-rumination. When faced with distress, individuals with low distress tolerance may use maladaptive strategies such as avoidance-oriented coping (Leyro et al., 2010). Interestingly, co-rumination has been described as an avoidance strategy (Stone et al., 2017). Thus, individuals with low distress tolerance may rely on co-rumination, which in turn could lead to high levels of normative anxiety. This may suggest that the children and adolescents in our study presented low distress tolerance, which may explain our observed associations between co-rumination and trait anxiety, test anxiety, and anxiety sensitivity.

Contagion of internalizing symptoms

Contagion of internalizing symptoms may be another potential mechanism underlying the association between co-rumination and normative anxiety. Contagion of internalizing symptoms refers to the notion that having friends with internalizing symptoms presents a risk for oneself, such that a friend’s symptoms may predict increases in one’s own internalizing symptoms (Schwartz-Mette & Rose, 2012). Thus, studies on contagion of internalizing symptoms suggest that anxiety can occur regardless of whose problem is discussed.

Schwartz-Mette and Rose (2012) conducted a study that looked at the role of co-rumination in the contagion of internalizing symptoms (such as depression and anxiety) in 548 children and adolescents. Results of the study found that co-rumination mediated contagion of both depressive and anxiety symptoms, whereby symptoms of one friend were positively associated with co-rumination, which then presented a positive association with a friend’s anxiety symptoms

six months later. Schwartz-Mette and Rose (2012) therefore proposed that co-rumination could account for contagion, as an individual may take on their friend's distress and perhaps internalize their friend's distress through unintentional mimicking. Moreover, replication of their findings for anxiety contagion would be beneficial as the anxiety measure used in the study contained some symptom overlap with depression (Schwartz-Mette & Rose, 2012). Schwartz-Mette and Smith (2018) furthered the previous work by examining co-rumination and depression contagion in 480 adolescents. First, the study replicated the findings of Schwartz-Mette and Rose (2012), indicating the importance of co-rumination for depression contagion. Beyond this, the study was able to identify certain contexts in which co-rumination can facilitate contagion, namely high personal distress, excessive reassurance seeking, and high friendship quality. When interpreting their results, the authors noted that these specific contexts could be used as indicators for adolescents that are at risk of experiencing depression contagion (Schwartz-Mette & Smith, 2018). It would be interesting for future studies to first, examine whether co-rumination plays a role in the contagion of normative anxiety and second, investigate whether the same contexts (as found by Schwartz-Mette and Smith (2018)) would apply for co-rumination and contagion of different forms of normative anxiety.

Together, these studies suggest that even if co-rumination does not revolve around one's own problems, that this behaviour can impact the other dyad member's internalizing symptoms. Future studies could investigate the association between co-rumination and different forms of normative anxiety by instructing dyads to concentrate on one friend's problem. If so, the strength of the associations between the two friends could be compared as the strength of the associations may be stronger in the friend whose problems are being discussed.

Association between co-rumination and state anxiety

In our study, the association between co-rumination and state anxiety was nonsignificant in both children and adolescents. As discussed in Chapter 2, Bayesian information criteria (BIC_{10}) were used to estimate Bayes factors (Jarosz & Wiley, 2014) for the nonsignificant associations between co-rumination and state anxiety in children and adolescents. Our calculations indicated strong evidence in favor of no association existing between co-rumination and state anxiety in both age

groups. As these results are unique to our specific dataset, future studies should aim to replicate our findings. Results from these studies may provide additional evidence in favour of the absence of an association between co-rumination and state anxiety in children and adolescents.

Our findings align with the theoretical construct of state anxiety, in that it is a fleeting state of emotions in reaction to a stimulus (Spielberger, 1972). This is because, instead of serving as a means to react to a psychosocial stressor, co-rumination has been described as an effort to cope with such a stressor (Byrd-Craven et al., 2011). In other words, the temporary nature of the emotions felt with state anxiety may not require a need to cope with the situation, as co-rumination would attempt to do.

Another potential explanation for the lack of observed association between co-rumination and state anxiety may be that the relationship between co-rumination and normative anxiety is limited to different measures of trait anxiety (trait anxiety, test anxiety, anxiety sensitivity). Co-rumination may make problems appear more salient (Borowski & Rose, 2016, as cited in Rose et al., 2017) and therefore, may amplify anxious personality traits. In other words, the anxious personality trait predisposes the individual to experience anxiety when faced with a particular situation, where co-rumination may act to amplify their anxious response. Alternatively, co-rumination may influence anxiety forms. A study by Carlucci et al. (2018) suggested that as co-rumination focuses heavily on problems, it may serve to activate and reinforce certain maladaptive schemas, where these schemas have been shown to mediate the relationship between co-rumination and trait, cognitive, and somatic anxiety. This suggests that traits may play an intricate role in the association between co-rumination and forms of anxiety. Together, this may provide insight into the lack of observed association between co-rumination and state anxiety in our study.

With that said, our findings deviate from one study that showed a positive and significant relationship between co-rumination and state anxiety in adults (Keshishian et al., 2016). This sample consisted of undergraduates (mean age of 19.4 years) and adults from the community (mean age of 26.6 years), whereas our sample consisted of children (ages 11 to 12) and adolescents (ages 16 to 17). Therefore, our sample may have been too young to detect an

association between co-rumination and state anxiety. In other words, the association between co-rumination and state anxiety may only become apparent between the ages of 17 (the oldest adolescents in our sample) and late adolescence/young adulthood (the age of the undergraduate students in the study of Keshishian et al. (2016)). Additional acquired life experiences of an older age group (e.g., post-secondary education, moving out) may not only contribute to more co-rumination and state anxiety but to the emergence of an association between the two constructs.

Nevertheless, our study suggested that co-rumination was not associated with state anxiety in children and adolescents. However, replication of our findings is necessary before any conclusions can be made regarding the presence or absence of an association. Future studies could explore the association between co-rumination and state anxiety in a larger sample, consisting of children, adolescents, and adults to determine whether an association is present and, if so, the age at which this relationship emerges. It is recommended that these studies explore nonsignificant findings using Bayes factors to determine whether the study lacked statistical power or whether an association truly does not exist (Dienes, 2014). Moreover, if no association is found between co-rumination and state anxiety, this suggests that interventions aimed at mitigating co-rumination should target youth with forms of trait anxiety, rather than current levels of state anxiety.

Co-rumination, normative anxiety, and depression

In our study, the effect sizes for the significant associations between co-rumination and normative anxiety in children (anxiety sensitivity) and adolescents (trait anxiety, test anxiety, and anxiety sensitivity) were small. As noted in Chapter 2, these associations occur within complex organisms and studying other factors may better our understanding of these relationships. Depression could be one of these factors as both co-rumination and different forms of normative anxiety (trait anxiety, test anxiety, and anxiety sensitivity) have been associated with depression.

Co-rumination and symptoms of depression

Several studies have investigated the relationship between co-rumination with friends and symptoms of depression. Beyond finding positive and significant correlations between co-

rumination and depression (Dombrowski, 2014; Rose et al., 2007), research has shown that co-rumination is also positively associated with concurrent depression symptoms (Starr & Davila, 2009) and within-day increases in depressed mood (White & Shih, 2012). Furthermore, co-rumination has been associated with an increase in symptoms of depression over time (i.e., prospective symptoms). For instance, although both high and low levels of co-rumination were positively associated with prospective symptoms of depression over a five-month period, high levels of co-rumination were associated with a greater prospective increase in depressive symptoms compared to low levels of co-rumination (Hankin et al., 2010).

Studies have also investigated whether the association between co-rumination and depression differs according to the co-rumination partner. Calmes and Roberts (2008) conducted a study in adults aged 18 to 45 that investigated co-rumination in different dyads (friends, romantic partners, roommates, and parents) and its relationship with emotional distress, including anxiety and depression. A significant positive association between co-rumination and depression was observed for friendship dyads, whereas no association was found for dyads with a romantic partner, roommate, or parent (Calmes & Roberts, 2008). Along the same lines, the authors of a 2017 study recognized that the association between co-rumination and depression may vary across different dyads (i.e., parent, romantic partner, sibling, and friend) and across varying levels of co-rumination (i.e., low, moderate, and high; Ames-Sikora et al., 2017). This possibility was investigated in 175 young adults. Indeed, the association between co-rumination and depression levels differed whether co-rumination occurred with a parent (no association), a romantic partner (linear association), siblings, and friends (positive quadratic association; Ames-Sikora et al., 2017). With regards to the latter, both low and high levels of co-rumination with siblings and friends were associated with higher levels of depression, whereas moderate co-rumination was associated with lower levels of depression (Ames-Sikora et al., 2017). Nevertheless, high levels of social support were associated with both moderate and high levels of co-rumination in all relationships. From this, it was suggested that moderate levels of co-rumination with siblings and friends might be adaptive, as it provides high support without depressive trade-offs, whereas these trade-offs occur when co-ruminating with a romantic partner. Further, it was suggested that co-ruminating with a parent might be associated with the smallest emotional risk (Ames-

Sikora et al., 2017). These findings align with the ideas put forward in Chapter 2, that co-rumination with parents is less emotionally risky (Waller & Rose, 2013). Therefore, it may be interesting for future studies to compare the content of co-ruminative discussions with friends and parents. This may shed light on how co-rumination with parents is less risky and how parents may lead more productive co-rumination sessions. Furthermore, despite the fact that interventions may educate and perhaps lessen the frequency of co-rumination, this behaviour may never completely disappear in friendships. Moreover, given the presence of a quadratic association between co-rumination and depression (Ames-Sikora et al., 2017), this indicates that there may be certain advantages to co-rumination that we may not want to eliminate through intervention. Thus, it would be interesting to see whether strategies used by parents during co-ruminative discussions could be applied during co-rumination with friends to perhaps mitigate the associated risk in friendships. With that said, it may also be possible that friends do not possess the same maturity as parents to adopt these strategies. Aside from this, the study by Ames-Sikora et al. (2017) put forward an interesting idea that the association between co-rumination and internalizing symptoms may vary according to levels of co-rumination. Future research could explore whether the significant associations found in the current study (between co-rumination and trait anxiety, test anxiety, and anxiety sensitivity) remain at moderate levels of co-rumination.

Co-rumination and clinical depression

Co-rumination has also been examined in relation to clinical depression. Using retrospective measures of depression, Stone et al. (2010) conducted a study looking at the association between current levels of co-rumination and a history of depressive disorders in 81 children. While controlling for current depression, the study found that co-rumination was associated with a history of a depression diagnosis. Specifically, children reporting higher co-rumination were more likely to have a history of depression than children reporting low levels of co-rumination. Due to the retrospective nature of the study, the authors proposed that their findings could be interpreted in two ways: co-rumination may lead to the development of depression or alternatively, high levels of co-rumination may be a consequence of a past depressive episode (Stone et al., 2010). Subsequently, Stone et al. (2011) conducted a study in 106 adolescents to

address whether co-rumination could predict the onset of clinical depression at a two-year follow-up. The study provided evidence to suggest that co-rumination is a risk factor for depressive disorders, as individuals with high baseline levels of co-rumination had a quicker onset of depression compared to those with low levels of co-rumination within two years (Stone et al., 2011). These findings were supported by a subsequent study which found that talking about problems elicited an increase in depressed mood for high co-ruminators but not for low co-ruminators (Starr, 2015). Moreover, Waller et al. (2014) investigated co-rumination in a sample where approximately half of the participants had a current depression diagnosis and the other half did not (control group). Results revealed that individuals with a depression diagnosis co-ruminated more with parents and peers compared to controls. With this evidence, Waller et al. (2014) noted that their findings alongside those of Stone et al. (2010) and Stone et al. (2011) suggest that co-rumination is not only present in those with a current diagnosis of depression but can also precede and succeed a depressive episode. Together, these studies demonstrate that co-rumination is associated with symptoms of depression, clinical depression, and that depressive disorders may make individuals more vulnerable to co-rumination.

Normative anxiety and depression

To further understand the link between co-rumination and normative anxiety, studies could also investigate how depression plays a role in this association given that research has also found a positive relationship between depression and trait anxiety, test anxiety, and anxiety sensitivity.

Although Wang et al. (2019) found a significant positive association between co-rumination and depression in children, their most interesting finding lies in their additional analyses involving cognitive flexibility and rumination. Cognitive flexibility refers to an individual's capacity to readily adjust their behaviour according to changes in the environment (Armbruster et al., 2012). It was found to moderate the association between trait anxiety and depression (Wang et al., 2019). Specifically, a difference in depression levels was found when comparing degrees of cognitive flexibility, such that higher depression was found in those with lower cognitive flexibility (Wang et al., 2019). Moreover, high levels of rumination have been associated with lower levels of cognitive flexibility (Owens & Derakshan, 2013) and rumination has been associated with

depression (Nolen-Hoeksema, 2000). Thus, Wang et al. (2019) found that rumination mediated the effect of cognitive flexibility. Further, rumination was more likely in those with low cognitive flexibility, which may provide insight into how depression may develop in individuals with low flexibility and high trait anxiety (Wang et al., 2019). Although co-rumination and rumination are two distinct constructs (as discussed in Chapter 1), there exists some degree of overlap. Therefore, co-rumination may be intertwined in the relationship between trait anxiety and depression.

In addition, a study in 420 adolescents found positive and significant correlations between trait and test anxiety, trait anxiety and depression, as well as test anxiety and depression (Akinsola & Nwajei, 2013). This suggests that these forms of anxiety and depression can co-exist (Akinsola & Nwajei, 2013). As we used a different measure of test anxiety, future studies could aim to replicate the findings of Akinsola and Nwajei (2013) using the Children's Test Anxiety Scale (Wren & Benson, 2004). These studies would be beneficial as they could reveal whether the relationship between test anxiety and depression holds across measures.

Finally, a significant positive correlation was found between anxiety sensitivity and depression in a sample of 234 children and adolescents recruited from an anxiety research clinic (Weems et al., 1997). Similar results were found in a large community sample of 1065 adolescents (McLaughlin & Hatzenbuehler, 2009) indicating that the association between anxiety sensitivity and depression is generalizable across different populations.

To summarize, our study found small effect sizes for the significant associations between co-rumination and normative anxiety in children (anxiety sensitivity) and adolescents (trait anxiety, test anxiety, and anxiety sensitivity). As the literature has found that co-rumination and the different forms of normative anxiety used in our study present a relationship with depression, future studies could include a measure of depression to have a better understanding of the factors that may influence the relationship between co-rumination and normative anxiety in children and adolescents. Moreover, as a limitation of the current study was a lack of general measure of psychopathology or measure of depression, this would allow us to determine whether

the effects reported in the current study are specific to anxiety, compared to general mental health or even depression.

Use of alternative measures of co-rumination

The current study used self-report measures of co-rumination. Alternative measures, such as observational, daily-diary, and ecological momentary assessment measures, could be used to determine if our findings are generalizable across different measurement methods.

As mentioned in Chapter 2, future studies could utilize laboratory-induced co-rumination to study its relationship with normative anxiety. By analyzing the content of co-ruminative interactions, observational studies could identify the specific elements of co-rumination (e.g., rehashing, speculation, negative feelings) that are associated with different forms of normative anxiety and whether the time spent focusing on those elements influences the association. For example, an observational study found that only one aspect of co-rumination (dwelling on negative feelings) and the seconds spent co-ruminating were associated with greater anxiety, whereas the other aspects were associated with friendship quality and closeness (extensive problem talk, rehashing, speculation, mutual encouragement; Rose et al., 2014).

Beyond this, our study measured co-rumination cross-sectionally. Future studies could measure co-rumination (and normative anxiety) over a consecutive number of days to determine whether our findings are applicable to the daily lives of youth. It is possible that the associations between co-rumination and normative anxiety fluctuate over time. Thus, daily-diary paradigms and ecological momentary assessments could be used to capture these fluctuations over several days and weeks, respectively.

Hruska et al. (2017) measured co-rumination in 78 adolescents through the completion of an online daily-diary survey for seven consecutive days. The survey consisted of four modified questions from the original The Co-rumination Questionnaire (Rose, 2002) and asked participants to reflect on their co-rumination behaviours within the last 24 hours with any dyad (Hruska et al., 2017). The survey also included questions about daily stress and affect. One of the results of the study found that time was negatively associated with co-rumination (Hruska et al., 2017), such

that co-rumination decreased over the experimental protocol (days 1-7). This suggests that co-rumination may not be constant in the lives of youth over time and in turn, this may affect its association with normative anxiety. As we did not use a longitudinal design, future studies could explore whether fluctuations in co-rumination over time have a mitigating effect on its association with normative anxiety.

Waller et al. (2014) used ecological momentary assessments and a self-report questionnaire to measure co-rumination in individuals ages 11 to 17. Participants first completed the self-report questionnaire in the laboratory. Thereafter, for the next three consecutive weeks, participants completed 42 structured interview telephone calls with an experimenter to evaluate co-rumination that had occurred within the hour preceding the call. Interestingly, the correlation between both measures of co-rumination (ecological momentary assessment and questionnaire) was nonsignificant. When interpreting their findings, Waller et al. (2014) suggested that each measure may capture different aspects of co-rumination. With this, studies could utilize different measures of co-rumination (via daily life and questionnaire) simultaneously to better capture co-ruminative behaviours. Furthermore, it would be interesting for a future study to examine the same associations between co-rumination and normative anxiety in our study using both measures to determine whether the associations vary according to the method of quantifying co-rumination.

Conclusion

The objective of this exploratory study was to measure the association between co-rumination and state anxiety, trait anxiety, test anxiety, and anxiety sensitivity in children and adolescents, while considering sex and age. We found that co-rumination was associated with anxiety sensitivity in children, with trait anxiety, test anxiety, and anxiety sensitivity in adolescents, and that these associations did not vary across sex. From these findings, we generated two hypotheses: 1) co-rumination is associated with anxiety sensitivity in young individuals, particularly in adolescence and 2) the relationship between co-rumination and different forms of normative anxiety evolves across development.

Beyond the studies investigating the relationship between co-rumination and various forms of anxiety (anxiety symptoms and clinical anxiety), our findings reveal that co-rumination also presents an association with different forms of normative anxiety. Along these lines, this study was unique as it examined several forms of normative anxiety simultaneously in relation to co-rumination. Consequently, co-rumination has been associated with various forms of anxiety throughout the literature and may pose difficulty for interventions trying to mitigate these associations. In other words, studies could identify the form of anxiety that co-rumination presents the strongest association with in order to help guide interventions more effectively. To do so, studies could use a wide variety of anxiety measures quantifying anxiety symptoms, clinical forms of anxiety, and normative forms of anxiety. It is also possible that these findings present differently across varying subgroups. For instance, co-rumination within community samples may present stronger associations with normative anxiety than with clinical forms of anxiety, whereas the opposite may occur in samples with clinical disorders.

In conclusion, this study highlighted the importance of studying co-rumination and normative anxiety in children and adolescents. The hypotheses proposed in this study require evaluation through confirmatory studies and future longitudinal designs could also provide insight into the directionality of these relationships.

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Appendix 1

Study	Anxiety measure	Age range	Mean age	Grade level	Observed association
Rose (2002)	RCMAS	-	-	3, 5, 7, and 9	Positive
Rose et al. (2007)	RCMAS	-	-	3, 5, 7, and 9	Positive
Calmes & Roberts (2008)	BAI	18-45	19.7	-	Positive
Starr & Davila (2009)	SAS-A	-	13.45	-	None
Waller & Rose (2010)	YSR	-	-	5, 8, and 11	Positive
Hankin et al. (2010)	MASQ	11-17	14.5	6, 7, 8, 9, and 10	Positive
Larsen (2011)	BAI	18-24	19	-	Positive
Tompkins et al. (2011)	YSR	14-19	16.84	9, 10, 11, and 12	Positive
Jose et al. (2012)	SAS-A	13-16	-	-	Positive
Schwartz-Mette & Rose (2012)	CMAS	-	-	3, 5, 7, and 9	Positive
Peterson (2012)	SIAS	18-25	18	-	None
Waller & Rose (2013)	YSR	-	-	5, 8, and 11	Positive
Doyle (2013)	STAI-Trait	-	18.71	-	Positive
Gelb (2013)	BAI, DASS-21	-	Male: 20.58 Female: 21.75	-	None
Rose et al. (2014)	CMAS	-	-	7 and 10	Positive
Dombrowski (2014)	BAI	17-19	18.27	-	Positive
Smith-Schrandt (2013)	DASS, SIAS	18-54	20.62	-	Positive
Dirghangi et al. (2015)	CMAS*	12-13	-	-	Positive
Keshishian et al. (2016)	STAI-State	-	Undergraduate: 19.4 Community: 26.6	-	Positive
Van Zalk & Tillfors (2017)	SPSQ-C	13-15	14.05	-	None

Study	Anxiety measure	Age range	Mean age	Grade level	Observed association
Griffiths (2017)	GAD-7, SPIN	T1: 18-73 T2: 22-73	T1: 35.18 T2: 38.59	-	Positive
Carlucci et al. (2018)	STICSA-Trait	-	23.9	-	Positive
Ioffe et al. (2020)	SCARED	11-14	12.49	6, 7, and 8	Negative/None
Ohannessian et al. (2021)	SCARED	-	12.75	7 and 8	Positive

Revised Children's Manifest Anxiety Scale (RCMAS) (Reynolds & Richmond, 1978); Beck Anxiety Inventory (BAI) (Beck et al., 1988); Social Anxiety Scale for Adolescents (SAS-A) (La Greca & Lopez, 1998); Youth Self-Report (YSR), anxious/depressed subscale (Achenbach & Rescorla, 2001); Screen for Child Anxiety Related Disorders (SCARED) (Birmaher et al., 1997); Children's Manifest Anxiety Scale-Revised (CMAS) (Reynolds & Richmond, 1985); Mood and Anxiety Symptom Questionnaire (MASQ) (Watson et al., 1995); The Depression Anxiety and Stress Scale (DASS and DASS-21) (Lovibond & Lovibond, 1995); State-Trait Anxiety Inventory (STAI) (Spielberger et al., 1983); The Social Interaction Anxiety Scale (SIAS) (Mattick & Clarke, 1998); State Trait Inventory for Cognitive and Somatic Anxiety (STICSA-Trait) (Ree et al., 2008); The Generalised Anxiety Disorder 7 (GAD-7) (Spitzer et al., 2006); The Social Phobia Inventory (SPIN) (Connor et al., 2001); Children's Manifest Anxiety Scale (CMAS*) (Reynolds & Richmond, 1997); The Social Phobia Screening Questionnaire for Children (SPSQ-C) (Gren-Landell et al., 2009). Adapted from "The Relationship between Co-rumination and Internalizing Problems: A Systematic Review and Meta-analysis," by J. S. Spendelow, L. M. Simonds and R. E. Avery, 2017, *Clinical Psychology and Psychotherapy*, *24*(2), p. 516-518 (DOI: 10.1002/cpp.2023) Copyright 2016 by John Wiley & Sons, Ltd.

Appendix 2

Construct	Questionnaire	English reference	French reference
Normative anxiety			
State anxiety	State-Trait Anxiety Inventory for Children	Spielberger et al. (1983)	Turgeon & Chartrand (2003)
Trait anxiety	State-Trait Anxiety Inventory for Children	Spielberger et al. (1983)	Turgeon & Chartrand (2003)
Test anxiety	Children's Test Anxiety Scale	Wren & Benson (2004)	CESH
Anxiety sensitivity	Childhood Anxiety Sensitivity Index	Silverman et al. (1991)	Stassart & Etienne (2014)
Subjective stress			
	Perceived Stress Scale for Children	White (2014)	CESH
Motivation			
	Motivation toward Education Scale for Elementary School		Vallerand et al. (1989)
	Motivation toward Education Scale for High School		Vallerand et al. (1989)
Perfectionism			
	Child-Adolescent Perfectionism Scale	Flett et al. (2016)	Douilliez & Hénot (2013)
Emotion regulation			
	Emotion Regulation Questionnaire for Children and Adolescents	Gross & John (2003)	Gosling et al. (2018)

Construct	Questionnaire	English reference	French reference
Social support			
	Children and Adolescent Social Support Scale	Malecki & Demary (2002)	Meylan et al. (2014)

Note. If the original questionnaire was written in English, the French version of the questionnaire (and the corresponding reference) are mentioned.

Table 9. – Questionnaires Administered to Children and Adolescents in the MATA Study

Construct	Questionnaire	English reference	French reference
Normative anxiety			
State anxiety	State-Trait Anxiety Inventory Form Y	Spielberger et al. (1983)	Gauthier & Bouchard (1993)
Trait anxiety	State-Trait Anxiety Inventory Form Y	Spielberger et al. (1983)	Gauthier & Bouchard (1993)
Anxiety sensitivity	Anxiety Sensitivity Index	Reiss et al. (1986)	CESH
Subjective stress			
	Perceived Stress Scale	Cohen et al. (1983)	Bellinghausen et al. (2009)
Hyperparenting			
	Hyperparenting questionnaire	Ashton-James et al. (2013)	CESH
	Parents as Social Context Questionnaire	Skinner et al. (2005)	CESH
	The World Out There	Gurland & Grolnick (2005)	Mageau & Ranger (personal communication, n.d.)
Emotion regulation			
	Emotion Regulation Questionnaire		Christophe et al. (2009)

Table 10. – Questionnaires Administered to Parents of Participating Children and Adolescents in the MATA Study

Construct	Questionnaire	English reference	French reference
Normative anxiety			
State anxiety	State-Trait Anxiety Inventory Form Y	Spielberger et al. (1983)	Gauthier & Bouchard (1993)
Trait anxiety	State-Trait Anxiety Inventory Form Y	Spielberger et al. (1983)	Gauthier & Bouchard (1993)
Subjective stress			
	Perceived Stress Scale	Cohen et al. (1983)	Bellinghausen et al. (2009)
Professional burnout			
	Maslach Burnout Inventory	Maslach & Jackson (1981)	Dion & Tessier (1994)

Table 11. – Questionnaires Administered to Teachers of Participating Children and Adolescents in the MATA Study