The interplay between perceived stress and socio-emotional and behavioural factors during adolescence

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1 Chapter 1—General introduction

In this chapter, I provide insights into theoretical studies and empirical research that focus on the origins and effects of perceived stress during adolescence. I review the current state of scientific knowledge concerning the associations between perceived stress and socio-emotional and behavioural factors during adolescence that will serve as the basis for the present study. Overall, the main contribution of this thesis to the established body of research is its combined usage of aspects of educational science and developmental psychology by examining the interplay between socio-environmental factors within a school context and socio-emotional and behavioural risk as well as protective factors for adolescents’ health and emotional stability.

1. Introduction

In our Western society, the majority of people thrive primarily on performance, high productivity, status, property and wealth accumulation, competition and perfection. These motivational drives are present not only in adulthood and the workplace, but also in childhood and early adolescence, particularly within the school context. School is considered a top stressor during adolescence (American Psychology Association, 2013a); studies have found stress levels increasing as children progress from preadolescence to adolescence (Moksnes, Bradley Eilersten & Lazarewicz, 2016), and peaking in early adolescence (see Seiffge-Krenke, Aunola, & Nurmi, 2009). Focusing on the effects of perceived stress during adolescence is important; this period in life is characterized by significant neurobiological, biological (i.e., hormonal and cognitive), psychological and social changes, and a greater vulnerability to socio-emotional and behavioural difficulties (McInerney & McInerney, 2006; Wigfield & Eccles, 2001). Furthermore, this period is characterized by intense and turbulent emotions, as adolescents experience more variable mood states than adults (see Kenny,
Stress plays a key role in the development of socio-emotional and behavioural difficulties and, moreover, is an indicator of an imbalance between the individual and his or her social environment (see Seiffge-Krenke et al., 2009). According to Bronfenbrenner’s biosocio-ecological model (Bronfenbrenner, 1975, 1979, 1989; Bronfenbrenner & Ceci, 1994), the developing child participates in different environments (i.e., microsystems such as family and school) that interact with his or her development, manifesting themselves in the mesosystem of the child (Bronfenbrenner & Morris, 1998). An important microsystem during adolescence is school, which has a major influence on students’ development and socio-emotional well-being (see Wigfield & Eccles, 2001). The school microsystem is characterized by many daily situational difficulties (e.g., daily peer and teacher interaction, noisy environments, homework and exams) that are potentially stressful for adolescents. According to Lazarus and Folkman’s (1984) transactional model, these daily hassles are cognitively appraised and can lead to perceived stress. In essence, stress results if a daily situation is defined (during primary appraisal) as potentially threatening and no suitable and effective coping strategy is available (during secondary appraisal). These cognitive processes analysing daily situations do not necessarily result in perceived stress for all individuals, but effective coping strategies are needed to overcome perceived stress. In turn, (chronic) perceived stress can become a threat for an adolescent’s healthy development when no effective resources or coping strategies are available during secondary appraisal (for more details, see Chapter 1.1.1 and Chapter 2 – Study I).

Individuals must deal and cope with various daily hassles in various microsystems related to puberty, the school context, family, problems with peers, teachers or romantic
relationships (Krapić et al., 2015). Not all adolescents have the cognitive ability or resources to cope adequately with everyday hassles; as a result, the individual might develop socio-emotional and behavioural difficulties, such as symptoms of hyperactivity, loneliness, conduct problems, problem with peers and teachers, or depressive symptoms.

As do both the bio-socio-ecological model (Bronfenbrenner, 1975, 1979, 1989; Bronfenbrenner & Ceci, 1994) and the transactional model by Lazarus and Folkman (1984), the cognitive vulnerability-transactional stress theory by Hankin and Abramson (2001) postulates that a transactional relationship between the individual and his or her environment explains major depressive disorder (MDD) and depressive symptoms\(^1\) among cognitively vulnerable individuals who are confronted with negative or stressful life events. The cognitive ability (i.e., cognitive vulnerability) to cope with *dependent* and *independent* life events plays a key role within the theory (for further details, see Chapter 1.1 and Chapter 3 – Study II). Studies have shown a comorbidity and bidirectionality between stress and symptoms of depression and later MDD (see Braet et al., 2013; Hammen, Brennan, & Le Brocque, 2011; Hankin & Abramson, 2001; Krapić et al., 2015; Lombas et al., 2014). Also, perceived stress in adolescence has been found to be associated with attention-deficit hyperactivity disorder (ADHD): Early adolescents perceived greater levels of stress and adversity when compared to their peers without ADHD (Humphreys et al., 2018). Moreover, the worldwide-prevalence of ADHD during adolescence is estimated to be 5% (see Humphreys et al., 2018), while the prevalence of ADHD diagnoses increased twofold from 6.8% to 14.4% between 2005 and 2014 (see Davidovitch, Koren, Fund, Shrem, & Porath, 2017).

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\(^1\) Following the 5\(^{th}\) edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), which was released in 2013 (American Psychiatric Association, 2013), an individual diagnosed with MDD shows five or more symptoms (e.g., insomnia, significant weight loss, hypersomnia, fatigue or loss of energy) during the same two-week period almost every day. In contrast, individuals showing depressive symptoms but are not diagnosed with MDD do not show five or more symptoms during the same two-week period.
Perceived stress has been found to be positively associated with other socio-emotional and behavioural difficulties (i.e., problems with peers or teachers, conduct problems, bullying, deviant behaviour or even delinquent behaviour and the feeling of loneliness) (see Agnew, 1992, 2001; Moon & Morash, 2017; Qualter et al., 2013; Sigfusdottir, Kristjansson, Thorlindsson, & Allegrante, 2016; Williams, Turner-Henson, Davis, & Soistmann, 2017). Furthermore, perceived stress is negatively associated with socio-emotional and behavioural strengths (i.e., prosocial behaviour and the feeling of belonging; see Raposa, Laws, & Ansell, 2016); albeit those aspects share a certain comorbidity and bidirectionality with each other.

Unfortunately, not all adolescents and children have enough awareness or adequate coping strategies (e.g., supportive and positive social relationships with peers and teachers or a positive climate within the school microsystem) that could act preventively and enhance healthy development. The objective of my Ph.D. study is to identify potential starting points for prevention and intervention strategies for students’ stress that could be easily implemented in a school environment. To accomplish this, I have examined the precise interplay between perceived stress and aspects of socio-emotional and behavioural strengths and difficulties—and the potential influence of environmental factors in the school context—during the transition from early to middle adolescence.
1.1 Stress: Historical development

During the 20th century, various academic disciplines have focused on the origins and effects of stress on individuals. Selye (1946, 1950, 1956) and Cannon (1929, 1935) can be described as pioneers of stress research, defining stress as a general reaction of an organism; their models can be labelled biological-stress models (see Busse, Plaumann, & Walter, 2006).

Cannon (1929, 1935) first introduced the fight or flight response as an unspecific biological reaction to harmful (stressful) situations. Moreover, he discovered the importance of adrenaline and the nervous system, as individuals face situations that might disturb the body’s homeostasis. This unspecific biological response in cases of potential harm to homeostasis has an evolutionary benefit, as it allows the organism either to fight or flight. This conclusion is supported by Selye (1946, 1950, 1956), who defines stress as an unspecific answer of the organism when confronted with unspecific stressors (e.g., threat to homeostasis). Stressors can be defined as any environmental situation that leads to stress within the individual (e.g., daily hassles, loss of a beloved one, noisy environments, poverty or exams). In contrast to Cannon, Selye realized that stress does not always have to be harmful (distress), as it can also be perceived in a positive way (eustress). For example, during a class test, perceived stress can enhance concentration by producing higher adrenaline levels. By developing the General Adaption Syndrome2—which consists of three stages: (1) the alarm reaction, (2) resistance and (3) exhaustion (Selye, 1946, 1950, 1956)—Selye (1956) is seen as the main pioneer of stress research.

In subsequent years, stress has been defined from a sociological point of view by Holmes and Rahe (1967) and Anderson (1991). In contrast to the biologically oriented stress research mentioned above, perceived stress is no longer defined as an unspecific reaction of the organism to any stressor. It has been postulated that every stressor leads to a specific

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2 For further information see Selye (1946, 1950, 1956).
stress-reaction. Utilizing the concept of acculturative stress (i.e., stress caused by the move from ones’ culture of origin towards another culture; Berry, 1998), Anderson (1991) has examined stress reactions and identified stress among black Americans who experienced difficulties and specific stressors arising from their adaptation process (Joiner Jr, & Walker 2002). Using their life-event-theory and the resulting social readjustment rating scale, Holmes and Rahe (1967) postulate that there are always certain events in individuals’ lives (e.g., death of a loved one, divorce or marriage) that can lead to perceived stress and illness when perceived cumulatively.

Other researchers, such as Polenz and Becker (1997), Hobfoll (1998), and Antonovsky (1987), examined stress by focusing on individuals’ resources and the threat of losing them. These models can be categorized as resource-focused stress models (Busse et al., 2006). Polenz and Becker (1997) and Hobfoll (1998) have postulated that the threat or actual loss of resources, such as specific objects, privileged conditions or psychological and physiological health, do lead to perceived stress (Buchwald & Hobfoll, 2013; Busse et al., 2006), whereas Antonovsky (1987) has focused on maintenance of health by asking ‘what does maintain health?’ From this salutogenetic perspective, it is necessary to identify individual resources and protective factors (i.e., generalized resistance resources) in coping with various stressors (see Busse et al., 2006). Aside from the above-mentioned models, Karasek and Thorell (1990) and Siegrist (1996) have examined the role of a working environment and its effects on an individual’s stress level. Karasek and Thorell (1990) assume that high requirements, limited opportunity for personal control, highly monotonous work and social isolation are associated with chronic stress, whereas Siegrist (1996) focuses on high-effort/low-reward conditions at work. Siegrist postulated that an imbalance between high effort spent and low reward received at work would be ‘[…] particularly stressful as this imbalance violates core
expectations about reciprocity and adequate exchange in a crucial area of social life’ (Siegrist, 1996, p. 28).

One prominent theory in present health research that integrates biological, cognitive and psychological factors is the cognitive vulnerability-transactional stress theory, which assumes a dynamic interaction between the individual (i.e., cognitive vulnerability and the individual’s resources to cope with perceived hassles, stressors or negative life events) and his or her environment. The theory attempts to integrate findings from disparate areas of depression research, such as cognitive, genetic and interpersonal studies, to offer a model capable of explaining depression vulnerability during a lifetime that coincides with existing theories of depression (Hankin & Abramson, 2001). Following Hankin and Abramson (2001), the revision of the generic cognitive vulnerability-stress model, which conceptualize the stress–depression association as static and unidirectional, is necessary for four reasons: (1) research in psychopathology and emotions suggests there is a need to incorporate initial negative effects in the causal chain leading to depression; (2) there must be an expanded conceptualization of cognitive vulnerability; (3) there must be an integration of interpersonal theories; and (4) there is need for a developmentally sensitive model due to the dramatic increase in depression in children from early to middle adolescence (Hankin & Abramson, 2001). The revision postulates that there is a transactional relationship between the individual and his or her environment (i.e., negative life events). As in Lazarus and Folkman’s transactional stress model, this perception of negative life events might be defined as negative or threatening during primary appraisal (for more details see Chapter 1.1.1). Specifically, the theory differentiates between independent and dependent negative life events: Independent

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3 This theory postulates that: “[…] an individual with cognitive vulnerability is more likely to become depressed than nonvulnerable individuals when she or he confronts a negative event and interprets the event in a negatively biased manner […] and/or makes negative inferences about the cause, consequences, or self-implications of the event […]” (Hankin & Abramson, 2001, p. 777).
(fateful) events are those beyond individuals’ control (e.g., death of a loved one), while dependent negative life events are those to which individuals partly contribute through aspects of their behaviour and personality (e.g., problems with peers or teachers, or breaking up a romantic relationship) (Hankin & Abramson, 2001). A potential failure to develop the skills needed to cope with dependent and independent negative life events might lead to an increased stress level or depressive symptoms. At this point, an overlap between the cognitive vulnerability-transactional stress model and the transactional stress model of Lazarus and Folkman (1984) can be found. For example, the secondary appraisal is an assessment of individuals’ coping resources and options which in turn are evaluated based on intra-individual and environmental factors (Cohen, 1984; Lazarus & Folkman, 1984). If the individual has the skills to cope with dependent and independent negative life events, a coping strategy will be selected at the end of the secondary appraisal. In turn, individuals with a lack of coping resources have an increased tendency to feel overstressed and become depressed, influencing how future dependent and independent negative life events are defined and handled (see Ingram & Luxton, 2005). Moreover, depression and stress then might lead to an increase of later dependent negative life events, as individuals might excessively seek reassurance and be rejected by others (see Hankin & Abramson, 2001). Put simply, maladaptive methods of coping with dependent and independent negative life events in childhood and throughout the developmental period of adolescence may be detrimental to the development of effective coping skills. This might lead to depression, future negative definitions during primary appraisal, compromised resilience and the encouragement of vulnerability (Ingram & Luxton, 2005). These findings align with studies finding an increase of depressive symptoms, MDD and perceived stress during adolescence (see Grützmacher & Raufelder, 2015; Moksnes et al., 2016; Thapar et al., 2012) that are associated with disadvantageous outcomes for individuals and their societies.
The most prominent theoretical approach in current stress research is the *transactional model of stress and coping* proposed by Lazarus and Folkman (1984) that will be presented in the following chapter in more detail.

### 1.1.1 Definition of stress: The transactional model of stress and coping

The definition of the phenomenon of perceived stress is often based on the transactional model of Lazarus and Launier (1981) and Lazarus and Folkman (1984). In this model, perceived stress is defined as a relational concept, in which individuals need to balance the demands of their immediate environment with their ability to meet them (Lazarus & Launier 1981; see Eppelmann et al., 2016). Lazarus and Folkman (1984) postulate a bidirectional and dynamic interplay between the individual (i.e., subjective perception, interpretation and coping) and his or her immediate environment (see Busse et al., 2006; Raufelder & Hoferichter, 2017). In contrast to Selye’s and Cannon’s work, in which the intensity of and reaction to a situation or stressor causes an unspecific biological stress-reaction, stress within the transactional model of stress and coping results from the consequences of subjective perception and evaluation of (daily) situations or specific stressors from the viewpoint of its significance for the individual’s well-being (see Lazarus & Folkman, 1987; Raufelder & Hoferichter, 2017; Saile & Scalla, 2006). Specifically, perceived stress is seen as a condition that occurs when the transaction between a person and his or her immediate environment leads to a perceived discrepancy between demands and resources (which can have biological, psychological or social origins) (Lazarus & Folkman, 1984; Moksnes et al., 2016; Moksnes, Løhre et al., 2016).

In this theory, stressors are defined as daily hassles that are evaluated differently by every individual; not every stressor leads to perceived stress in every individual. Therefore, the theory underlines intraindividual and interindividual differences in stress appraisals, reactions and coping. Lazarus and Folkman (1984) postulate that individuals evaluate specific
daily hassles within three stages of appraisals relating to the implications of the specific situation on the individuals’ well-being (Lazarus & Folkman, 1987).

During primary appraisal, which is a cognitive evaluation, an individual is faced with a daily situation (e.g., noisy environment, poverty, or an exam), which will be interpreted by the individual as either a potential threat or a potential benefit (see Seiffge-Krenke et al., 2009). If the situation is appraised as a potential threat, the stress can be of three types: harm or loss, threat, or challenge (see Krapić et al., 2015; Lazarus & Folkman, 1987). According to Lazarus and Folkman (1987), a harm or loss stressor has already been experienced, whereas the threat of harm might be anticipated in the future. Challenge describes the potential for mastery or gain, so that, even if stressful, an event might be viewed positively (see Seiffge-Krenke et al., 2009).

During secondary appraisal, which is also a cognitive evaluation, the individual evaluates his or her control of the stressful situation and chooses between potential coping strategies to deal with the situation (see Krapić et al., 2015; Lazarus & Folkman, 1987; see Raufelder & Hoferichter, 2017; see Seiffge-Krenke et al., 2009). Primary and secondary appraisal are parallel processes that may happen automatically and therefore often appear unconsciously (see Krapić et al., 2015).

Coping can be defined as constantly changing cognitive and behavioural efforts to manage specific internal or external demands (Lazarus & Folkman, 1984; Eppelmann et al., 2016). Potential coping strategies are classified into two types: emotion-focused or problem-focused. Problem-focused coping can be directed either inwards (i.e., altering some specific aspects of the self) or outwards (i.e., altering specific aspects of the environment) (see Beck, Lange, & Tröster, 2016; see Krapić et al., 2015). These coping strategies include cognitive and behavioural actions to analyse or solve specific problems (see Krapić et al., 2015). Emotion-focused coping strategies are actions taken to decrease emotional distress by
expression or suppression of emotions or by seeking emotional support from others (Beck et al., 2016; see Krapić et al., 2015).

In the final form of appraisal—reappraisal—an individual receives new, relevant information that might alter his or her behaviour in a specific situation (see Busse et al., 2006; Lazarus & Folkman, 1984; see Raufelder & Hoferichter, 2017). This means that after primary and secondary appraisal, the individual reinterprets and re-evaluates the output, the situation and the effectiveness of the used coping strategy; this process may then influence similar future primary appraisals. For example, an upcoming exam in school is appraised as potentially threatening (i.e., not passing it) during primary appraisal. As a coping strategy (secondary appraisal), the individual prepares himself or herself for the exam and learns the information that will be on the test. During reappraisal, the question arises whether the selected and used coping strategy (i.e., learning) was effective (i.e., passed the test). If this was effective, the individual might not define a similar future situation as potentially threatening during primary appraisal and therefore might not perceive stress. If the coping strategy was not effective, the individual might develop or adopt other coping skills in order to avoid defining the next exam as a potential threat.

In sum, the chapter has shown various definitions and methods of defining perceived stress and its origins. The present study focuses mainly on the transactional model by Lazarus and Launier (1981) and Lazarus and Folkman (1984), the elaborated cognitive vulnerability-transactional stress theory by Hankin and Abramson (2001) and the bio-socio-ecological model by Bronfenbrenner (1975, 1979, 1989). The objective of this study is to examine how these theories directly contribute to the understanding of the interplay between socio-environmental factors in the school context as well as risk factors and protective factors affecting adolescents’ health and socio-emotional and behavioural stability.
1.1.2 Stress in adolescence

Research indicates that the overall level of perceived stress tends to increase from preadolescence to adolescence (Moksnes et al., 2016) and peaks in early adolescence (see Seiffge-Krenke et al., 2009). Based on 7,000 students between 10 and 18 years, the DAK-Gesundheit survey (2017) has shown that almost half (43%) of early, middle and late adolescents report they are seriously affected by stress and one-third report they suffer from headaches, back pain and sleep disorders resulting from perceived stress. Similarly, the American Psychology Associations’ Stress in America Survey (2013b) reported that more than 25% of 1,018 surveyed teenagers exhibited symptoms such as neglecting responsibilities, feeling overwhelmed and having negative thoughts, while 33% felt tired, nervous or anxious, irritable or angry. This finding aligns with results reported by Feld and Shusterman (2015), who found that one-third of 333 students in the US reported feeling anger or back pain, or both, and 12% reported anxiety or panic attacks at least once a week due to perceived stress. Another study from Germany reported that 25% out of 11,000 students felt chronically stressed (Beisenkamp, Klöckner, Hallmann, & Preißner, 2009). Given these results, it is not surprising, that the school microsystem was considered the primary source of stress for adolescents, as students must perform well to get good grades to secure future career and life goals (i.e., high performance requirements) (American Psychology Association, 2013a; Beisenkamp et al., 2009; Bergmüller, 2007; Oertel, 2010).

1.1.3 Stress in school context

According to Bronfenbrenner’s bio-socio-ecological model (Bronfenbrenner, 1975, 1979, 1989; Bronfenbrenner & Ceci, 1994), individuals participate in various microsystems that reciprocally interact with their development. In sum, all microsystems form a person’s mesosystem (Bronfenbrenner & Morris, 1998). School, where adolescents spend most of their time during a vulnerable period of life, is one of the most important developmental contexts.
for adolescents’ psychological functioning (see Moksnes, Løhre et al., 2016). Therefore, school can provide opportunities to either foster or weaken students’ healthy physiological and emotional stability.

As Chapter 1.1.2 has shown, most of the stressors reported by students are perceived in a school context (see Löhaus, Beyer & Klein-Heßling, 2004), and studies have indicated that even students in third and fourth grade report stress symptoms, such as headaches and sleep disorders (see Beck et al., 2016). Survey results of 11,000 students between 9 and 14 years of age report that one-third of these German students feel stressed by school regularly (LBS-Kinderbarometer, 2015). Moreover, the survey revealed that schools do not offer enough opportunities to speak with friends or to take breaks, which increases the feeling of stress (LBS-Kinderbarometer, 2015). This result is in line with results by Deb, Strodl, and Sun (2015), who examined 190 higher secondary students in India and found that 63.5% of these students feel stressed due to academic pressure. In sum, students within a class context perceive stress, as they do not have enough time to relax or to spend time with peers and feel pressure to perform well.

Furthermore, students are faced with various social stressors, such as troubled interaction with peers and teachers, external pressure to perform well (i.e., from parents), school rules and norms as well as school/class conflicts (see Moksnes, Løhre et al., 2016). Seiffge-Krenke et al. (2009) have shown that relationship stressors have their peak during early adolescence, whereas achievement and school-related stressors are more frequently reported in middle or late adolescence.

As Deb, Strodl and Sun (2015) have shown, stress is a risk factor for psychopathology, such as MDD or depressive symptoms, and they can therefore be seen as an important cause of students’ emotional instability. Moreover, research has outlined that stress is not only a relevant risk factor for healthy psychological development during adolescence, but also is
negatively associated with school careers and vocational health in early and middle adolescence (see Eppelmann et al., 2016). Hence, even minor stressors—including school-related problems—have been found to be mutually related to adolescents’ development (see Eppelmann et al., 2016). The school context is significantly characterized by stress and the potential to either strengthen or weaken students’ socio-emotional and behavioural aspects. The following chapter will provide a more detailed insight into the origins, prevalence, definitions and associations of socio-emotional and behavioural strengths and difficulties during adolescence, and especially within the school context.

1.2 Socio-emotional and behavioural factors

1.2.1 Socio-emotional and behavioural factors as strengths and difficulties in adolescence

As the previous chapter illustrated, adolescence can be described as a chaotic developmental period, during which adolescents are vulnerable and exposed to various internal and external changes (see Feld & Shusterman, 2015). These changes and the resulting high level of perceived stress are associated with various socio-emotional and behavioural factors and physiological well-being. Specifically, empirical and theoretical research indicates statistically significant bidirectional relationships and comorbidities between perceived stress and socio-emotional and behavioural factors during adolescence, including prosocial behavior, a sense of belonging, loneliness, depressive symptoms and MDD, symptoms of hyperactivity and ADHD, problems with peers, and conduct problems (see Agnew, 1992, 2001; Hankin & Abramson, 2001; Moon & Morash, 2017; Qualter et al., 201; Raposa et al., 2016; Sigfusdottir et al., 2016; Williams et al., 2017).

Prosocial behavior as strength

An important strength is prosocial behavior, which can be defined as voluntary behavior to benefit others and was found to be essential in the formation and maintenance of
healthy (interpersonal) relationships (see Cáceda et al., 2014). Research has revealed that prosocial behavior is associated with various positive outcomes, such as academic success, high self-esteem and high-quality relationships (see Van der Graaff, Carlo, Crocetti, Koot, & Brantje, 2018). However, adolescent cognitive and behavioural changes may challenge an individual’s regulation of emotions, and they may weaken an individual’s ability to focus attention on others’ needs; this in turn might lead to a decrease in prosocial behavior (see Van der Graaff et al., 2018). Unfortunately, only a few longitudinal studies have examined the changes, stability, development and maintenance of prosocial behavior during adolescence and produced conflicting results (for details see Van der Graaff et al., 2018). Carlo et al. (2015) found an increase in prosocial behavior towards strangers between the age of 13 and 16 and helping behavior between age 15 and 18 (Eisenberg et al., 2005), while Caprara and colleagues (2015) found non-linear growth of prosocial behavior between age 12 and 14. In contrast, Nantel-Vivier et al. (2009) found stable levels of prosocial behavior between age 10 and 14, and decreases between age 13 and 18 (Carlo et al., 2007; Luengo Kanacri et al., 2013). The interaction and association between MDD and prosocial behavior is mostly unclear, partly due to the methodological problem to establish causality and directionality (see Cáceda et al., 2014). At the same time, it has been suggested that prosociality promotes healthy development when appropriately regulated, and that prosocial behavior plays a protective role against mood disorder or anxiety disorder (see Cáceda et al., 2014).

*School belonging as strength*

Another important socio-emotional and behavioural strength is the sense of school belonging, which can be defined as a feeling of connectedness to school or the educational institution. Most importantly, the sense of belonging accompanies the feeling of fitting in with other members (i.e., peers) of the same microsystem (see Pittman & Richmond, 2007). As the sense of belonging is a fundamental motivation and key to cognitive processes and positive
affect, it can be defined as an essential strength and protective factor. Studies have shown that school belonging is associated with a lower probability of depressive symptoms, MDD and loneliness (see Maurizi, Grogan-Kaylor, Granillo, & Delva, 2013; see Pittman & Richmond, 2007). In turn, the lack of belonging can influence students’ cognitive vulnerability, the perception of stress and students’ vulnerability (see Maurizi et al., 2013).

*Social relationships as strength and difficulty*

Supportive and positive relationships that result in students’ sense of belonging in family, school and peer-contexts are an important strength, as they were found to be associated with students’ emotional well-being and academic success (see Maurizi et al., 2013). Particularly during adolescence, relationships with peers become both more essential and complex as adolescents seek a higher level of independence from their parents (see Bukowski, Simard, Dubois, & Lopez, 2011; see Persike & Seiffge-Krenke, 2014; Teppers et al., 2013; Wentzel & Muenks, 2016).

Several studies have highlighted the importance of peers and friendships for healthy development during adolescence (see Azmitia et al., 2009; see Furrer & Skinner, 2003). However, peer-relationships are associated with both positive outcomes (e.g., academic achievement, emotional engagement, well-being and physical activity) and negative outcomes (e.g., loneliness, aggression, MDD, depressive symptoms, delinquency and substance abuse) (see Reynolds & Crea, 2015). Adolescents with positive social relationships with peers were found to show greater emotional engagement, higher levels of (school) belonging, more prosocial behavior with less antisocial behavior, greater emotional well-being and less emotional distress (see Crosnoe, Cavanagh, & Elder, 2003; see Furrer & Skinner, 2003; see Wentzel, Ladd, & Caldwell, 2004). In contrast, adolescents who had negative social relationships with peers and perceived peer rejection exhibited less classroom participation,
demonstrated a stronger wish to avoid school and reported more loneliness (Buhs, & Ladd, 2006).

**Loneliness as difficulty**

Loneliness can be defined as the result of a discrepancy between the desired and achieved quality of one’s social network. It detrimentally affects an adolescent’s mental health in various ways, as it was found to be associated with MDD, anxiety disorder, substance abuse, and suicidal ideation (see Qualter et al., 2013; Vanhalst, Goossens, Luyckx, Scholte, & Engels, 2013; Vanhalst, Luyckx, & Goossens, 2014; Van Roekel et al., 2015). With the onset of early adolescence, during which adolescents’ social lives become more complex, feelings of loneliness increase and remain present throughout adolescence. These feelings drop between young adulthood and middle age, and then they rise marginally in old age (see Qualter et al., 2013; Van Roekel et al., 2015). Moreover, Qualter et al. (2013) have shown that loneliness between seven and 17 years predicted MDD or depressive symptoms and poorer self-reported general health and causes psychological and physiological strains (stress), which in turn increases students’ risk of emotional disorders later in life (see Qualter et al., 2013).

**Major depressive disorder (MDD) and depressive symptoms as difficulties**

Major depressive disorder, as a socio-emotional and behavioural difficulty, is a public health concern: Whereas the prevalence of MDD in childhood is low (less than 1%), it rises substantially throughout adolescence (see Thapar et al., 2012) to affect about 1–2% of prepubertal and about 3–8% of adolescents (see Cáceda et al., 2014; see Horowitz & Garber, 2006). Another study indicates that the prevalence of MDD among adolescents ranges from 1–27%, whereas the lifetime prevalence is estimated to range from 15–25% (see Maurizi et
al., 2013). Overall, about 350 million people worldwide are diagnosed with MDD (see Cáceda et al., 2014; see Horowitz & Garber, 2006).

Besides MDD, depressive symptoms among adolescents are even more common: 10–49% of adolescents report they perceive depressive symptoms weekly (see Maurizi et al., 2013). Major depressive disorder has several detrimental effects on the developing child and adolescent and their futures, including social and educational impairment, unemployment, poor physical health, substance abuse, academic problems, high-risk sexual behavior, physical health problems, impaired social relationships, and a thirty-fold increased risk of completed suicide (see Horowitz & Garber, 2006; Lombas, Martín-Albo, Valdivi-Salas, & Jiménez, 2014; Meinzer, Pettit, & Viswesvaran, 2014; Riglin et al., 2016).

Attention-deficit hyperactivity disorder (ADHD) and conduct problems as difficulties

Another socio-emotional and behavioural difficulty during childhood and adolescence is ADHD, which affects up to 9% of children (see Meinzer et al., 2014) and was found to be associated with various negative outcomes, such as higher rates of academic failure, delinquency and substance abuse. Furthermore, children with ADHD also tend to show higher rates of co-occurring psychiatric disorders, including unipolar depressive disorder (see Meinzer et al., 2014), a finding that supports comorbidity between ADHD and depressive symptoms. Beyond that comorbidity, a meta-analysis has shown that 5.8–14.7% of children and adolescents met criteria for deviant or conduct disorder, while 1.8–8% of these children also met criteria for MDD (see Wolff & Ollendick, 2006). Moreover, 22.7–83.3% of children and adolescents with MDD also met criteria for conduct disorder, while 8.5–45.4% with conduct disorder showed also criteria for MDD (see Wolff & Ollendick, 2006). This aligns with research indicating that more than 30% of adolescents meeting criteria for MDD also meet criteria of conduct disorder, and more than 50% of adolescents with conduct disorder meet criteria for a depressive disorder (see Kofler et al., 2011). A study of high school
adolescents has shown that MDD in early adolescence is more predictive of later delinquency than vice versa (see Reynolds, & Crea, 2015). In addition, research indicates that MDD and conduct disorders tend to increase in prevalence during adolescence and that this comorbidity reaches its peak in middle adolescence (see Kofler et al., 2011; Wolff & Ollendick, 2006). Overall, empirical findings show longitudinal and cross-sectional co-occurrence (see Riglin et al., 2016).

1.2.2 *Socio-emotional and behavioural factors in school context*

Adolescents’ school context is mainly formed through daily interaction with peers and teachers. School is where children develop the social, emotional and relational skills necessary to build and maintain healthy relationships (see Hanish et al., 2016). From early childhood to middle childhood, social-cognitive skills become more complex and refined. As adolescents claim their autonomy from their parents, friendships become more stable and grounded (see Hanish et al., 2016; see Van Roekel et al., 2015).

As mentioned in Chapter 1.2.1, supportive relationships with peers and teachers are important for a healthy development and were found to be associated with various positive and negative outcomes, such as prosocial behaviour, sense of belonging, loneliness, academic success, and psycho-physiological functioning and emotional well-being (see Reynolds & Crea, 2015).

A positive teacher-student relationship is characterized by warmth, trust and low negativity, and was found to be associated with children’s emotional security and less externalizing problems, which is a key factor for the development of social, behavioural and self-regulatory competences (Baker, Grant, & Morlock, 2008; see De Laet et al., 2016). Furthermore, the quality of the teacher-student relationship was found to be associated with academic motivation effort, achievement and engagement (De Laet et al., 2016; Engels et al., 2016).
As outlined above, social relationships with peers have both positive and negative effects on healthy development during adolescence (see Azmitia et al., 2009; Furrer & Skinner, 2003). While positive and supportive peer relationships were found to be associated with a higher level of (school) belonging, greater emotional engagement, more prosocial behaviour, less antisocial behaviour, greater emotional well-being and less emotional distress, peer rejection was found to be associated with a greater level of loneliness, less classroom participation, perceived stress and depressive symptoms (Buhs, & Ladd, 2006; see Crosnoe et al., 2003; see Furrer & Skinner, 2003; see Wentzel et al., 2004; see Williams et al., 2017; see Woodhouse, Dykas, & Cassidy, 2012).

In sum, positive relationships with teachers and peers foster students’ feelings of fitting in and their sense of school-belonging. These are attitudes that might protect against both academic risk factors (e.g., school drop-out) and non-academic risk factors (e.g., suicidal ideation) (see Hamm & Faircloth, 2005; see Pittman & Richmond, 2007). Research demonstrates that prosocial children have better peer relationships, are at lower risk for externalizing behaviours, and perform better at school (see Caprara et al., 2014).

### 1.3 The association between stress and socio-emotional and behavioural factors

Research reveals that stressors are potential threats to adolescents’ well-being and healthy psychological as well as physiological development (see Moksnes, Løhre et al., 2016). During adolescence, which is characterized by less stability and greater vulnerability, students must recreate themselves from classroom to classroom and in their various microsystems. This might increase the perception of social and academic stress (Hanish et al., 2016). Similarly, through this ongoing reorientation to their immediate microsystem and by seeking autonomy from parents (Hanish et al., 2016; Van Roekel et al., 2015), students are also faced with potential (social) stress while developing and maintaining relationships with peers. On the one hand, relationships with peers become more essential during adolescence
and often serve as a refuge from potential stress within the microsystem of the family context, but on the other hand, these relationships can be stressful, as adolescents might perceive rejection by peers or experience the loss of friendships. The latter is reported by over half of adolescents as the major stressor related to the peer context and can result in loneliness or depressive symptoms, which in turn increase the level of perceived (social) stress (see Agoston & Rudolph, 2016; Persike & Seiffge-Krenke, 2014; Qualter et al., 2013; Vanhalst, Goossens et al., 2013; Van Roekel et al., 2015).

This finding is in line with research that indicates lonely adolescents experience more stress in everyday life, a condition that can lead to MDD and a range of other somatic and psychological symptoms (see Qualter et al., 2013). Moreover, cumulative and chronic stress was found to be associated with increased psychological symptoms as well as socio-emotional and behavioural difficulties: MDD, depressive symptoms, and anxiety, ADHD, aggression, problem with peers, conduct problems, deviant or even delinquent behaviour, risky health behaviour (e.g., substance abuse) and physical health outcomes (e.g., stomach-ache, sleep disorder and lower immune functioning) (see Graham, Christian, & Kiecolt-Glaser, 2006; Krapić et al., 2015; Lohaus, Beyer, & Klein-Heßling, 2004; Moksnes et al., 2016; Moksnes, Løhre et al., 2016; Raposa, Laws, Ansell, 2016). Adolescence is a period in which depressive symptoms and MDD were found to occur most frequently, with a lifetime prevalence ranging from 9.3–24% (see Krapić et al., 2015).

Moksnes, Løhre, Lillefjell, Byrne, and Haugan (2016) have found a positive and significant strong association between perceived stress due to school performance and depressive symptoms. Moreover, depressive symptoms were found to be associated with both academic and peer difficulties and overall poor psychosocial functioning (see Hankin & Abramson, 2001). Beyond that, Moksnes, Løhre et al. (2016) have shown that a higher level of (cumulative and simultaneous) stress experienced in everyday life was related to more
depressive symptoms in adolescence, which aligns with current research suggesting a reciprocal and dynamic interplay between stress and MDD (see Braet et al., 2013; Hammen et al., 2011; Hankin & Abramson, 2001; Krapić et al., 2015; Lombas et al., 2014). Moreover, stress related to the school context was found to be associated with psychological difficulties, such as depressive symptoms (Moksnes, Løhre et al., 2016).

1.4 General design of the Ph.D. study

As previous chapters illustrate, perceived stress has detrimental effects on socio-emotional and behavioural strengths and difficulties associated with negative effects on academic and health outcomes. The precise interplay between these factors from early to middle adolescence remains still unknown. This study focuses on adolescent students, as they are faced with different socio-cognitive and biological challenges resulting from perceived internal and external changes occurring in this developmental phase. In other words, adolescent students are especially vulnerable to negative influences. Therefore, successful starting points needs to be identified to support students’ healthy development and to foster children’s talents and academic careers. However, to identify successful starting points, one must first get deeper insight into the precise interplay between these factors and consider the constant interaction between an individual and his or her environment, which is the main goal of this study.

More specifically, the following research questions are addressed: Is the effect of perceived stress on socio-emotional and behavioural strengths and difficulties mediated or moderated by environmental factors (i.e., helpfulness and competition in class) during adolescence? Is there an interaction (moderation) between depressive symptoms and perceived stress—and which effect has a greater impact on the development of socio-emotional and behavioural strengths and difficulties? Is the association between socio-
environmental factors in school and emotional instability (i.e., perceived stress, depressive symptoms and loneliness) unidirectional or bidirectional over time?

To get deeper insight into these associations, in my first study (Chapter 2) I examine whether helpfulness and competition in early adolescence act as potential moderators or mediators in the association between perceived stress in early adolescence and socio-emotional and behavioural strengths (i.e., emotional problems, symptoms of hyperactivity, prosocial behaviour, problem with peers and conduct problems) in middle adolescence. Following Lazarus’ stress model, perceived helpfulness and competition in classrooms can be regarded as a resource or threat during secondary appraisal and might thus moderate or mediate the association between perceived stress and socio-emotional and behavioural strengths and difficulties (Gütmacher & Raufelder, 2015; Lazarus & Folkman, 1984; Resnick et al., 1997). In addition, I examine whether gender and age differences apply in this association, as girls tend to exhibit more cooperative-integrative behaviour, are more willing to offer or seek help and report higher levels of perceived stress and emotional sensitivities and prosocial behaviour. In contrast, (older) boys show more competitive behaviour in a classroom context and higher levels of symptoms of hyperactivity, problems with peers and conduct problems (see Faulstich-Wieland, 2008; see Rendtorff, 2014; Seiffge-Krenke, 2006).

In order to examine whether helpfulness and competition mediate or moderate the association, I first test the potential moderation effect with latent moderated structural equations (LMS). Second, I test the potential mediation effect by using structural equation modeling (SEM). Gender and age were included as covariates in both analyses.

In my second study (Chapter 3), I test whether perceived stress functions as a moderator in the association between depressive symptoms and socio-emotional and behavioural strengths and difficulties, since the relationship between perceived stress and MDD or depressive symptoms is postulated to be bidirectional (Hankin & Abramson, 2001).
As research primarily focused on MDD as an outcome-variable, I test whether depressive symptoms also function as an independent variable in the association with socio-emotional strength and difficulties during adolescence. Moreover, I elaborate the cognitive-vulnerability-transactional stress theory by testing the aspect of developmental sensitivity, especially as socio-emotional and behavioural difficulties can be influenced by internal (e.g., depressive symptoms) and external factors (e.g., stressors).

My third study (Chapter 4) is based on Bronfenbrenner’s bio-socio-ecological model (Bronfenbrenner, 1975, 1979, 1989; Bronfenbrenner & Ceci, 1994) and examines within-time and longitudinal associations between emotional instability (i.e., perceived stress, depressive symptoms and loneliness) and socio-environmental aspects of schools (i.e., sense of school belonging, student-student and teacher-student relationships) from early to middle adolescence. This precise and postulated interplay is examined using a latent cross-lagged SEM research design. In my final chapter, the findings of all three studies are summarized. Theoretical and practical implications, future directions and general conclusions are presented.
1.5 References


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2 Chapter 2—Study I

Do perceived helpfulness and competition in classroom contexts moderate or mediate the association between perceived stress and socio-emotional strengths and difficulties from early to middle adolescence?

2.1 Abstract

The highly competitive educational context of modern Western societies increases students' workload and their willingness to compete with others to acquire specialized knowledge and skills that support lifelong learning, which often goes along with higher perceived stress and socio-emotional and behavioral difficulties. However, less is known about whether helpfulness and competition function as potential moderators or mediators in the association between perceived stress and socio-emotional strengths and difficulties considering potential gender differences. Based on questionnaire data from a longitudinal study with 1088 students (Time 1: $M_{age} = 13.70, SD = 0.53$; Time 2: $N = 845, M_{age} = 15.32, SD = 0.49$) in German secondary schools the results of latent moderated structural equations (LMS) showed that perceived helpfulness and competition do not function as moderators. In turn, the structural equation modeling with indirect effects showed that perceived helpfulness in class fully mediated the association between perceived stress and prosocial behavior, whereas helpfulness and competition partially mediated the association between perceived stress and problems with peers for both girls and boys from early to middle adolescence.

2.2 Introduction

The highly competitive educational context of Western societies requires students to learn faster and more efficiently than others from an early age and to acquire specialized knowledge and skills that support lifelong learning (Stuhlmann, 2005; OECD & Statistic Canada, 2000), which often goes along with increased levels of stress in everyday life.
Unsurprisingly then, students report increasing stress levels during childhood and early adolescence (American Psychological Association, 2010; Feld & Shusterman, 2015). In fact, one third of German elementary school students reported high and sometimes chronic stress in relation to school (Deutscher Kinderschutzbund, 2012). Specific, stress-inducing factors that increase during adolescence (Grützmacher & Raufelder, 2015) include the number of hours spent on homework, perceived pressures to perform well, and achieve certain academic goals (Brown, Nobiling, Teufel, & Birch, 2011). During early and middle adolescence students are more vulnerable to varies stressors within the interpersonal, social and scholastic context such as extracurricular commitments and developmental changes that adolescence brings with it such as puberty, changing relationships with parents and challenges in peer relationships (Feld & Shusterman, 2015). This vulnerability and varies forms of perceived stress often leads to socio-emotional and behavioral difficulties, which are complex issues affected by biological, psychological, educational and social factors. The relationship between stressors, socio-emotional strengths and difficulties and the above-mentioned factors can be seen as bidirectional as socio-emotional strengths and difficulties and socio-emotional, psychological, educational and social factors also effect the amount of perceived stress. One educational and social factor, which can affect the level of perceived stress, is the classroom context, which is only one system amongst many in the lives of early adolescent students, albeit an important one (Cole, Daniels, & Visser, 2013). In school context, students not only perceive stress daily, but also helpfulness and/or competition in their stressful scholastic and social environment, which might minimize (helpfulness) or trigger (competition) the effects of perceived stress on socio-emotional and behavioral strengths and difficulties. Both aspects of social-school climate are important influence factors for stress and socio-emotional and behavioral strengths and difficulties specifically in early adolescence when peers become more essential for the developing child (Cook, Deng & Morgano, 2007). In detail, perceived
helpfulness and competition can be seen as a resource in overcoming stressful situations (Resnick et al., 1997). Perceived helpfulness in classroom context is a social buffer (moderation), while there are arguments, particularly from educational economics, that competition amongst students should be promoted as it may increase motivation (Kaplan & Maehr, 2007). Furthermore, positive social school climate is positively associated with socio-emotional strengths and negatively associated with socio-emotional and behavioral difficulties (Gottfredson, Gottfredson, Payne, & Gottfredson, 2005; Hoferichter & Raufelder, in press; Ludwig, 2013). Moreover, a three-wave longitudinal study by Torsheim, Aaroe, and Wold (2003) with 767 secondary school students has shown that perceived stress at baseline predicts lower levels of perceived support 12 months later, which implies the causal precondition of mediation analysis. This finding is supported through neuroscientific research highlighting that perceived stress activates (through stress hormones, such as norepinephrine and cortisol) the amygdala-based negative perception bias (Kukolja et al., 2008). Put simply: Individuals perceiving stress tend to perceive their environment (e.g., helpfulness and competition) as more negative as it might be, which in turn can result in harmful effects on socio-emotional and behavioral outcomes (Cohen et al., 2007). If perceived helpfulness/competition were moderators they would buffer the association between perceived stress and socio-emotional strengths and difficulties, whereas if they were mediators they would account for (partial mediators) or explain (full mediation) the association. Both statistical analyses include a third variable, which either effects the strength or direction of the predictor and outcome variables (moderation), or which accounts for the effects between those two variables (Wu & Zumbo, 2008).

According to Lazarus and Folkman (1984) stress is caused by small and relative events in everyday life. Daily hassles are defined as dynamic processes (transactions) that influence a conscientious, emotional and active individual (Schwarzer, 2000). Whether a
situation or event is interpreted as stressful depends on three processes that are at the heart of Lazarus’ conceptualization of stress: *Primary appraisal, secondary appraisal and reappraisal* (Lazarus & Folkman, 1984). During *primary appraisal*, the individual defines a particular event or interaction as negative, aversive, threatening or challenging for its well-being (Lazarus, 1995). During *secondary appraisal*, different coping possibilities are evaluated based on individual and external resources to be able to overcome the stressor. Finally, *reappraisal* occurs whenever an individual receives new, relevant information, which might alter his or her behavior in a specific situation (Plaumann, Busse, & Walter, 2006). However, each individual evaluates a situation differently and, consequently, a single situation is almost never universally perceived as stressful by all. Put simply, intra- and inter-individual differences persist.

During early adolescence, as educational demands and everyday scholastic hassles intensify (Stuhlmann, 2005; OECD & Statistics Canada, 2000), students may perceive more stress (Seiffge-Krenke, Aunola, & Nurmi, 2009) and experience personal/developmental (internal) and environmental (external) changes (Feld & Shusterman, 2015; McInerney & McInerney, 2006). In detail, research has shown that perceived stress is related to socio-emotional strength (i.e., prosocial behavior (von Dawans, Fischbacher, Kirschbaum, Fehr, & Heinrichs, 2012; Raposa, Laws, & Ansell, 2016)), negative emotional and behavioral states and difficulties (i.e., attention-deficit/hyperactivity disorder (ADHD) (Biedermann, 2005; Corominas et al., 2015; Molina, Pelham, Gnagy, Thompson, & Marshal, 2007; Molina & Pelham, 2014), emotional problems (Hammen, 2005; Hammen, Brennan, & Le Brocque, 2011; Iacovides, Fountoulakis, Kaprinos, & Kaprinis, 2003), misconduct and problems with peers (Agnew, 2001; Gottfredson et al., 2005; Sigfusdottir, Kristjansson, & Agnew, 2012) all of which increase during adolescence (see Pöhland & Raufelder, 2014).

Studies have also shown that girls tend to report higher levels of perceived stress
greater emotional sensitivities (Hammen, 2005) and prosocial behavior (Pursell, Laursen, Rubin, Booth-LaForce, & Rose-Krasnor, 2008) than boys. In turn, boys generally report more symptoms of hyperactivity (Isaksson, 2014) and conduct problems (Caprara et al., 2014) than girls. However, less is known whether this association is moderated or mediated by helpfulness and competition in class as a form of secondary appraisal following Lazarus’ stress model (Lazarus & Folkman, 1984). Hence, there is relatively little longitudinal research on perceived stress in large samples of adolescents (Seiffge-Krenke, 1995). The classroom climate (i.e., perceived helpfulness and competition) could be an essential starting point for school-based prevention and intervention strategies, as it is associated with students’ perceived stress (Grützmacher & Raufelder, 2015; Taki, 2010) and socio-emotional and behavioral strengths and difficulties (Gottfredson et al., 2005; Ludwig, 2013). Following Lazarus’ stress model, perceived helpfulness in classrooms can be regarded as a resource during secondary appraisal and might thus moderate or mediate the association between perceived stress and socio-emotional and behavioral strengths and difficulties (Gützmacher & Raufelder, 2015; Lazarus & Folkman, 1984; Resnick et al., 1997). In contrast, perceived competition in classrooms could outweigh in the above-mentioned association because it is often considered as an external stressor (Kaluza, 2011; Seiffge-Krenke, 2008). Furthermore, few studies indicated that perceived competition in class increases socio-emotional and behavioral difficulties (e.g., Taki, 2010), whereas helpfulness decreases these effects (e.g., Plenty, Östberg, Almquist, Augustine, & Modin, 2014). Gender differences in the perception of helpfulness and competition were also detected (Faulstich-Wieland, 2008; Seiffge-Krenke, 2006). For instance, girls tend to have a more cooperative-integrative behavior in class and are more willing to offer help or seek help by others whereas boys are more competitive in class (Faulstich-Wieland, 2008; Rendtorff, 2014; Seiffge-Krenke, 2006).
2.3 Current study

This study aims to shed light onto helpfulness and competition in class context as potential moderator or mediators in the association between perceived stress and socio-emotional and behavioral strengths and difficulties from early to middle adolescence. Based on the above mentioned theoretical and empirical research approaches, it was hypothesized that helpfulness and competition in class moderate (Ia) or mediate (Ib) the association between perceived stress and socio-emotional and behavioral strengths and difficulties. (II) Gender and age differences apply, such as girls tend to report more emotional problems, prosocial behavior, whereas boys show more problems with peers, conduct problems and symptoms of hyperactivity as well as older students report more socio-behavioral difficulties than girls.

2.4 Method

Sample and Procedure

The present study is based on the data set of a two-wave longitudinal, quantitative questionnaire survey of a large sample of students from 23 secondary schools in Brandenburg, Germany who took part on a large research project examining socio-emotional learning factors (Self-study). The data were collected on two occasions: First in the year 2011 when participants were early adolescent students in 8th grade (N= 1088; M_age= 13.70, SD = 0.53; 54% girls) (Time 1 – T1), and second 1.5 years later (2013), when the same participants were in 9th grade (N= 845; M_age= 15.32, SD = .49; 55% girls) (Time 2 – T2) and thus in the middle of adolescence. This particular age group was chosen due to the fact that socio-emotional and behavioral strengths and difficulties and perceived stress tend to increase during adolescence (Pöhland & Raufelder, 2014).

Moreover, in the run-up to the survey, respondents and their parents were asked for their agreement to participate and parents, schools, and students were thoroughly informed
about the voluntary nature of their participation. The data were collected via anonymous, written, class-based questionnaires and during each session, at least two research assistants were present to clarify any questions related to the items or the use of a Likert Scale. Hence, during answering the questionnaire students were asked to sit separately at single tables.

In order to minimize potential difficulties and/or misunderstandings with self-report data, operationalization and data handling was executed following Chan’s (2009) suggestions: First, only well-established scales were used for which construct validity was supported. Second, potential high correlations between the variables were controlled for common method variance. Third, specific item sets and subtle item formulations were employed to minimize the risk of social desirability responding (for detail see Glynn, 2013). However, as the focus of the present study was on students’ perceptions, additional raters were not considered. The hypotheses of this study were tested in Mplus 7.2 (Muthén & Muthén, 1998–2012).

**Measures**

**Independent Variable: Perceived Stress.** The Perceived Stress Scale, adapted by Cohen, Kamarck, and Mermelstein (1983), has a Cronbach’s alpha reliability coefficient of .78 (T1) for the present sample. The scale features nine items focusing on chronically perceived stress during the last four weeks, such as: “In the last month, how often have you been angered by things that were outside of your control?” and “In the last month, how often have you felt that difficulties were piling up so much that you could no longer overcome them?” Participants were asked to evaluate the nine questions on a five-point Likert scale ranging from one (never) to five (very often).

**Moderator/Mediator Variables: Helpfulness and competition in class.** The two variables helpfulness and competition in class were measured using Von Saldern and Littig’s (1987) Students’ Social Class Climate Scale. Perceived helpfulness and competition in class were measured with four items each. Helpfulness has an alpha reliability coefficient of .74
(T1) and includes statements such as: “If a student has to work with a partner, he/she finds him/her quite quick”. Competition in class context show an alpha reliability coefficient of .70 (T1) and includes statements such as: “Many students aspire to know more than their peers during a lesson”. Students were asked to rate those statements on a four-point-likert scale from one (disagree) to four (totally agree).

**Dependent Variable: Emotional Strengths and Difficulties.** The following subscales were borrowed from Goodman’s (1997) Strength and Difficulties Questionnaire (SDQ): (1) the Emotional Symptoms Scale (here: Emotional Problems), with a Cronbach alpha reliability coefficient of .73 (T2) for the present sample. The subscale consists of five items, including: “I get frequent headaches, stomach-aches or feel sick”; “I worry a lot”; “I am often unhappy, downhearted or tearful”. (2) The Hyperactivity subscale which consists of five items and revealed a Cronbach alpha reliability coefficient of .70 (T2) for the present sample. This subscale includes statements such as: “I am restless: I cannot stay still for long”; “I am easily distracted” and “I finish the work I am doing”. (3) The Prosocial Behavior subscale which measures emotional strength, consists of five items and revealed a Cronbach alpha reliability coefficient of .72 (T2) for the present sample. This subscale includes items such as: “I try to be nice to other people”; “I usually share with others”; “I try to help if someone is hurt, upset or feeling ill” (4) The Conduct Problems Subscale features a Cronbach alpha reliability coefficient of .57 (T2) and also consists of five items such as: “I get angry and often lose my temper”; “I usually do as I am told”; “I fight a lot”. (5) The Peer Problems Scale (in this study called Problems with Peers Subscale) consists of five statements and shows an alpha reliability coefficient of .55 (T2). This subscale includes statements, such as: “I am usually on my own. I generally play alone or keep to myself”; ”I have one good friend or more”; “I get on better with adults than with people my own age”. Although the Cronbach alpha values for items that measure conduct problems and problems with peers are not as high
as the other subscales’, parcels can be built based on Kopp and Lois’ (2012) stance that the critical value of Cronbach’s alpha is $\alpha > .50$. Participants were asked to rate all statements of the Strength and Difficulties Questionnaire on a three-point Likert scale from one (disagree) to three (totally agree).

Gender and age were included as control variables.

2.5 Statistical Analyses

All analyses were executed using Mplus 7.2 (Muthén & Muthén, 1998-2012) and robust maximum likelihood estimator (MLR). Initially, descriptive statistics and intercorrelations between the variables of interest were conducted. Next, another confirmatory factor analysis (CFA) were run in Mplus in order to produce a measurement model initially. In preparation for the CFA, Little, Cunningham, Shahar, and Widaman’s (2002) discussion about the benefits of parceling were deliberately endorsed: (1) doubtful correlations may be the outcome of estimating numerous items, (2) origins of variance could be shared by a subgroup of items from a great amount of items, though they are not in the focus of interest (3) single-item data is less predisposed to produce stable results. Hence random parceling, a common technique within psychological research (Marsh, Hau, Balla, & Grayson, 1998; Prats, 1990) was applied in order to reduce the number of items and thus arguably yield more stable results by preventing potential doubtful correlations and shared variance. Subsequently, the nine items of the Perceived Stress Scale were converted into three parcels consisting of three items each (SP1T1, SP2T1 and SP3T1) whereas the five items subsumed in each scale of the SDQ were transformed into two parcels consisting of three and two items each (Symptoms of Hyperactivity: HyperP1T2, HyperP2T2; Emotional Symptoms Scale: EPP1T2, EPP2T2; Prosocial Behavior Scale: PRP1T2, PRP2T2; Conduct Problem Scale: ConP1T2, ConP2T2; Problems with Peer Scale: PwiPeP1T2, PwiPeP2T2). The four items of helpfulness
and competition in class were each transformed into two parcels consisting of two items each (helpfulness: HibP1T1 and HibP2T1; and competition: KoP1T1 and KoP2T1).

In order to test the hypothesized moderation, latent moderated structural equations (LMS) procedure was used. In contrast to other SEM methods, LMS considers nonlinear effects and accounts for non-normality within sample distributions (Gerhard, Klein, Schermelleh-Engel, Moosbrugger, Gäde, & Brandt, 2015). Latter is particularly essential for latent dependent variables, due to the fact that these are generally not normally distributed because of the influence of interaction effects (moderation). Different simulation studies have supported that LMS yields efficient estimators of parameters, such as an authentic model difference test, which shows no indication of bias of standard errors (Dimitruk, Schermelleh-Engel, Kelava, & Moosbrugger, 2007; Klein, 2000; Klein & Moosbrugger, 2000; Moosbrugger, Schermelleh-Engel, Kelava, & Klein, 2009). However, as the dependent variables are not normally distributed, the $\chi^2$-values and other fit indices cannot be assessed. Therefore, in the first step, a model (model 1a) without interaction terms and algorithm has been designed to calculate the model fit, which was estimated with the four fundamental fit indices recommended by Hu and Bentler (1999): Chi-Square Test of Model Fit ($\chi^2$), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI) and Standardized Root Mean Square Residuals (SRMR). In order to compare the model 1a without interaction terms with the final model with interaction terms (model 2), the integration algorithm was added to the first model (1a) resulting in model 1b. Subsequently, model 1b was extended through the interaction term (models 2). Model 2 with potential moderators included (perceived helpfulness as well as perceived competition) was then compared with model 1b by conducting a $\chi^2$-difference test based on log likelihood values and scaling correction factors obtained with the MLR estimator (Satorra & Bentler, 2001). In order to account for the nested structure of the data (1088 students in 71 classrooms at T1, and
845 students in 67 classrooms at T2), the models were conducted using the type-is-complex approach established by Asparouhov (2005) for complex survey data (Asparouhov & Muthén, 2006). This multilevel approach corrects the bias of standard error and $^2$ values, which are created by the nested nature of the data (i.e., students in classes) (MacKinnon, 2008). To account for randomly missing data values, the models were estimated using full information maximum likelihood (FIML) in Mplus 7.2. All assumptions for FIML were tested and confirmed.

### 2.6 Results

**Descriptive Statistics and Intercorrelations**

Table 1 presents descriptive statistics (range, means, standard deviation, skewness and curtosis) and the intercorrelations between the variables of interest (see Table 1).
Table 1

Intercorrelations between perceived stress, helpfulness and competition in class (T1) and Hyperactivity, Problem with Peers, Emotional Problems, Conduct Problems and Prosocial Behavior (T2) and their Range, Means, standard deviations, Kurtosis and Skewness

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<td>7. ConT2</td>
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<td>8. ProT2</td>
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Note. StressT1= Perceived Stress Time 1, HelpT1= Helpfulness Time 1, CompT1= Competition Time 1; HyperT2= Hyperactivity Time 2, PWPT2= Problem with Peers Time 2, EmoT2= Emotional Problems Time 2, ConT2= Conduct Problems Time 2, ProT2= Prosocial Behavior Time 2; gender: 0= girls, 1= boys; *p < .05, ** p < .001
CFA

In order to produce a measurement model, an initial confirmatory factor analysis (CFA) was run. The indices revealed a good fit for this model \( \chi^2 (91) = 215.08; p < .001; \text{CFI} = .97; \text{RMSEA} = .04 (.03-.04); \text{SRMR} = .04 \).

LMS

As the dependent variables are not normally distributed in LMS, the \( \chi^2 \)-values and other fit indices cannot be assessed. For this reason, a model (model 1a) without interaction terms and algorithm has been designed to estimate the model fit \( \chi^2 (df= 115, N= 1088) = 316.982; p < .001; \text{CFI} = .94; \text{RMSEA} = .04 (.04-.05); \text{SRMR} = .05 \) in the first step. This model included direct paths from perceived stress, helpfulness and competition on socio-emotional and behavioral strengths and difficulties. Covariances between the independent variables as well as covariances between the dependent variables were examined. Gender and age were included as control variables, because (a) research has shown that gender and age are essential components of socio-emotional and behavioral strengths and difficulties (Chaplin, Hong, Bergquist, & Sinha, 2008; Hammen, 2005; Isaksson, 2014; Pursell et al., 2008) and (b) the reported correlation analyses on this sample support these findings. In order to compare the model 1a without interaction terms with the final model with interaction terms (model 2), the integration algorithm was added to the first model (model 1b; see Figure 1).
Fig. 1. LMS with the integration algorithm and without interaction term (Model 1b) between perceived stress and socio-emotional and behavioral strengths and difficulties (symptoms of hyperactivity; emotional problems; conduct problems; prosocial behavior; problems with peers); T1 = first measurement point; T2 = second measurement point (1.5 years later); gender and age. Significant effects shown as unstandardized coefficients (B) in bold face and standardized coefficients (β) in italics; bold pathways are significant at p < 0.05; not significant effects are not shown in the figure for clarity reasons. The correlations of constructs during the second measurement point are not reflected in the figure for clarity reasons and would be reported separately.
Next, model 1b was extended through the latent interaction terms (stress x helpfulness and stress x competition) (models 2; Figure 2).

![Diagram](image)

**Fig. 2.** LMS with interaction term (Model 2) between perceived stress and socio-emotional and behavioral strengths and difficulties (symptoms of hyperactivity; emotional problems; conduct problems; prosocial behavior; problems with peers); T1 = first measurement point; T2 = second measurement point (1.5 years later); gender and age. Significant effects shown as unstandardized coefficients (B) in bold face and standardized coefficients (β) in italics; bold pathways are significant at p < 0.05; not significant effects are not shown in the figure for clarity reasons. The correlations of constructs during the second measurement point are not reflected in the figure for clarity reasons and would be reported separately.

Model 2 was then compared with model 1b by conducting a χ²-difference test based on log likelihood values and scaling correction factors obtained with the maximum likelihood estimation with robust standard errors (MLR) (Satorra & Bentler, 2001). Results (χ² (df = 10) = 8.42, p > .05) indicated that model 1b fits the data better than model 2 (moderation: with interaction terms). In other words, helpfulness and competition do not function as moderators.
Structural Equation Modeling (SEM)

Following Baron and Kenney’s (1986) modus operandi, all requirements of a mediation analysis were met: As shown in the introduction and in the results of the correlation analyses, the predictor variable (perceived stress) is significantly related to the outcome variable (socio-emotional and behavioral strengths and difficulties), and the mediating variables (perceived helpfulness and competition in class) are significantly related to both the outcome variables and the predictor variable.

To test whether perceived helpfulness and competition function as mediators, a SEM was conceptualized including direct paths from (1) perceived stress (T1) to both perceived helpfulness and competition in class (T1), from (2) perceived stress (T1) to socio-emotional and behavioral strengths and difficulties (T2), as well as from (3) perceived helpfulness and competition in class (T1) to socio-emotional and behavioral strengths and difficulties (T2). In addition, indirect paths from perceived stress on socio-emotional and behavioral strengths and difficulties through perceived helpfulness and competition were added. Covariances were included for the associations between perceived helpfulness and competition, gender and age and perceived stress as well as between the five factors of socio-emotional and behavioral strengths and difficulties. Gender and age were included as control variables, because (a) research has shown that gender and age are essential components of socio-emotional and behavioral strengths and difficulties (Chaplin, Hong, Bergquist, & Sinha, 2008; Hammen, 2005; Isaksson, 2014; Pursell et al., 2008) and (b) the reported correlation analyses on this sample support these findings. The model fit of this final model showed a good fit: model $[\chi^2(116) = 344.53; p < .001; CFI = .94; TLI = .91; RMSEA = .04 (.04–.05); SRMR = .05].$

Finally, this model was compared to model 1b (see LMS procedure above) using a $\chi^2$-difference test. Results indicated $(\chi^2_{(df=2)} = 111.17, p < .001)$ that the model with indirect
effects (mediation) fits the data better (not worse) than the model without (model 1a) indirect effects and without interaction terms. That means that mediation model reflects the data best.

**Direct Effects.** Figure 3 presents the final SEM. Perceived stress in early adolescence is positively associated with symptoms of hyperactivity ($B = .18$, $SE = .04$, $\beta = .25$; $p < .001$), emotional problems ($B = .18$, $SE = .06$, $\beta = .38$; $p < .001$), conduct problems ($B = .08$, $SE = .03$, $\beta = .16$; $p < .001$) and problems with peers ($B = .06$, $SE = .03$, $\beta = .12$; $p < .05$) in middle adolescence. However, perceived stress in early adolescence is not significantly associated to prosocial behavior in middle adolescence. Furthermore, perceived stress is negatively associated with helpfulness ($B = -.26$, $SE = .05$, $\beta = -.25$; $p < .001$) and positively associated with competition in class ($B = .17$, $SE = .10$, $\beta = .18$; $p < .001$). In addition, the paths between helpfulness and prosocial behavior ($B = .16$, $SE = .04$, $\beta = .25$; $p < .001$) as well as problem with peers ($B = -.11$, $SE = .04$, $\beta = -.24$; $p < .05$) were found to be significant. The only positive significant association for competition in class context was found between competition and problem with peers ($B = .06$, $SE = .04$, $\beta = .13$; $p < .05$).

**Indirect Effects.** Three indirect effects were identified: helpfulness fully mediates the association between perceived stress in early adolescence and prosocial behavior in middle adolescence ($B = -.04$, $SE = .01$, $\beta = -.06$; 95% CIs $[-.06, -.02]$). Hence, helpfulness partially and weakly mediates the association between perceived stress in early adolescence and problems with peers in middle adolescence ($B = .03$, $SE = .01$, $\beta = .06$; 95% CIs $[.00, .05]$), and competition partially and weakly mediates the association between perceived stress and problems with peers ($B = .01$, $SE = .01$, $\beta = .02$; 95% CIs $[.00, .02]$).

**Covariances.** The covariances of perceived helpfulness and competition in class (T1) were negative and significant ($r = -.03/-.16$; $p < .05$), the covariance between gender and perceived stress (T1) were also negative and significant ($r = -.06/-.23$; $p < .05$), whereas the
covariance between age and perceived stress (T1) were positive and significant ($r = .03/.10; p < .05$). The covariance between age and gender at T1 was not significant.

The following covariances at T2 were found to be negative and significant: symptoms of hyperactivity and prosocial behavior ($r = -.01/- .13; p < .05$) prosocial behavior and problems with peers ($r = -.02/- .33; p < .001$) and prosocial behavior and conduct problems ($r = -.03/- .47; p < .001$). The covariances between the following sets (at T2) were found to be positive and significant: symptoms of hyperactivity and emotional problems ($r = .03/.22; p < .001$), emotional problems and problems with peers ($r = .04/.58; p < .001$), emotional problems and conduct problems ($r = .03/.40; p < .001$), conduct problems with problems with peers ($r = .02/.35; p < .001$) and conduct problems with symptoms of hyperactivity ($r = .05/.63; p < .001$).
Fig. 3. Mediation of helpfulness and competition in the association between perceived stress and socio-emotional and behavioral strengths and difficulties (symptoms of hyperactivity; emotional problems; conduct problems; prosocial behavior; problems with peers); T1 = first measurement point; T2 = second measurement point (1.5 years later); gender and age. Significant effects shown as unstandardized coefficients (B) in bold face and standardized coefficients (β) in italics; bold pathways are significant at p < 0.05; not significant effects are not shown in the figure for clarity reasons. The correlations of constructs during the second measurement point are not reflected in the figure for clarity reasons and would be reported separately.

2.7 Discussion

The present study examined whether perceived helpfulness and competition in class moderate or mediate the association between perceived stress and socio-emotional and behavioral strengths and difficulties from early to middle adolescence with the aim to identify a potential external approach for strategies of prevention and intervention, given that peers and their support play an increasing role in adolescents’ lives (Cook, Deng & Morgano, 2007).
Hypothesis Ia was not confirmed, because perceived helpfulness and competition do not function as moderators in this interplay. In other words, perceived helpfulness and competition are not able to buffer or trigger the effect of perceived stress on socio-emotional and behavioral strengths and difficulties. This might be due to the fact that social climate in class (i.e., helpfulness and/or competition) is not strong enough to buffer the internalized inability to cope with stress. Future studies might test other forms of peer support (i.e., friendship) and/or teacher support (i.e., appreciation, positive feedback) as potential moderators.

However, hypothesis Ib was not completely confirmed: Helpfulness in class operated as a full mediator between perceived stress and prosocial behavior and as a partial mediator between perceived stress and problems with peers, whereas competition only weakly and partially mediated the association between perceived stress and problems with peers. Since perceived helpfulness in class reduces the association between perceived stress and prosocial behavior to zero and simultaneously minimizes the effect of perceived stress on problems with peers, students who perceive stress in early adolescence can be prevented from showing less prosocial behavior and more problem with peers in middle adolescence by the perception of high levels of helpfulness. Therefore, perceived helpfulness in class protects individuals’ prosocial behavior and social well-being in class context. These results support research claims that perceived helpfulness and social support in class function as protective factors (Grützmacher & Raufelder, 2015; Lazarus, 1995; Taki, 2010). In contrast, competition only mediated the association between perceived stress and problems with peers partially, whereas the effects are very weak and should therefore be treated with caution considering the large sample. Nevertheless, results of the correlations analysis show that competition in class is positively associated with both perceived stress and socio-emotional and behavioral difficulties. Although competition in class is sometimes used as motivation strategy (Kaplan
& Maehr, 2007), our results indicate that this might be problematic in terms of the examined interplay.

Overall, only three of ten potential indirect effects were found to be significant, suggesting that helpfulness and competition in class are weak mediators, whereas four of five direct effects from perceived stress in early adolescence on socio-emotional and behavioral difficulties in middle adolescence were significant. This result highlights the impact of perceived stress in school particularly on the development of socio-emotional and behavioral difficulties. This finding fits well with research that revealed associations between perceived stress and socio-emotional and behavioral difficulties (Biedermann, 2005; Corominas-Roso et al., 2015; Hammen, 2005; Hammen et al., 2011; Molina et al., 2007; Molina, & Pelham, 2014).

Hypothesis II was partly confirmed, as the results indicate, that being a girl is associated with more emotional problems and prosocial behavior, whereas being a boy is associated with more problems with peers and conduct problems. Finally, age was weakly associated with showing conduct problems, such as older students show more conduct problems. This is in line with research that has shown that girls and boys differ in single variables used in this study, such as girls tend to report greater emotional problems such as sadness and/or depression followed by perceived stress (Chaplin et al., 2008), greater emotional sensitivities (Hammen, 2005), and prosocial behavior (Pursell et al., 2008), whereas boys show more conduct problems and problem with peers (Caprara et al., 2014; Faulstich-Wieland, 2008; Rendorff, 2014; Seiffge-Krenke, 2006). The direct effects of the SEM showed that perceived stress is positively related to competition in class, yet negatively related to helpfulness in class. This means that students who perceive stress do perceive less helpfulness albeit more competition in class. This result supports the postulated interplay of perceived stress and perceived helpfulness/competition in class (Grützmacher & Raufelder,
It follows that for students who perceive stress in early adolescence, perceived helpfulness can prevent the erosion of their prosocial behavior and partly having problem with peers in middle adolescence. Nevertheless, this study cannot support the argument that perceived helpfulness in class can function as a potential coping resource during secondary appraisal in the association between perceived stress in early adolescence and socio-emotional and behavioral difficulties in middle adolescence (emotional problems, symptoms of hyperactivity, conduct problems and problems with peers) (Lazarus & Folkman, 1984; Lazarus, 1995).

Furthermore, the direct effects have shown that perceived stress in early adolescence is positively associated with symptoms of hyperactivity in middle adolescence. As symptoms of hyperactivity is a component of ADHD (Biedermann, 2005; Corominas et al., 2015; Molina et al., 2007, Molina & Pelham, 2014) this result is alarming in a non-clinical sample, as research has shown that students with ADHD tend to show lower performance and achievement in school (Biedermann, 2005; Harpin, 2005). Furthermore, long-lasting symptoms of hyperactivity and ADHD negatively predicts children’s well-being (e.g., substance abuse, sleeplessness, depression) as well as the quality of peer relations (e.g., lack of friendship, social exclusion, problems with peers and misconduct) (Hammen, 2005; Harpin, 2005; Molina et al., 2007, Molina & Pelham, 2014). The results shed light onto the relationship between perceived stress and symptoms of hyperactivity, which research on ADHD and stress has shown to be reciprocal (Corominas et al. 2015).

In addition, perceived stress in early adolescence can amplify emotional problems, problems with peers and conduct problems in middle adolescence. This might be a cause of non-affective coping of stress during secondary appraisal (Lazarus & Folkman, 1984), which might lead to emotional problems (i.e., frustration and/or anger), problems with peers and/or conduct problems (Agnew, 1992; Agnew, 2001; Sigfusdottir et al., 2012).
In sum, the results highlighted the potential of helpfulness in class as a starting point for decreasing students’ stress level and its detrimental effects on peer relationships. Fostering helpfulness in class can prevent the erosion of prosocial behavior for students who perceive stress. However, only three of ten potential indirect effects (mediation) were found to be significant and none of the interaction terms (moderation) were found to be significant, meaning that helpfulness and competition in class cannot mediate all the effects between perceived stress and socio-emotional and behavioral difficulties. In contrast, four of five direct effects between stress and socio-emotional and behavioral difficulties were significant. In other words, the effects from perceived stress in early adolescence on socio-emotional and behavioral difficulties in middle adolescence have more impact, possibly because both are internal variables, unlike helpfulness and competition in class, which are external variables. Accordingly, even in this study’s healthy, non-clinical student sample, perceived stress has detrimental effects on students’ socio-emotional and behavioral difficulties 1.5 years later. Therefore, stress prevention and intervention programs should be implemented in schools as early as possible. There are several positive examples of mindfulness-based training programs for teens and adolescents (e.g., mindfulness-based stress reduction for teens (MBSR-T: Biegel, 2009) and MindfulnesKids (van de Weijer-Bergsma, Langenberg, Brandsma, Oort, & Bögels, 2014)). Mindfulness intervention should be used in conjunction with school psychology for the sake of students’ well-being in the school context (Felver, Doerner, Jones, Kaye, & Merrell, 2013). Promoting mindfulness in school and thereby promoting stress reduction and emotional strengths could ameliorate adolescents’ ability to cope with diverse everyday hassles in the school context and ultimately function as effective reappraisal (Lazarus & Folkmann, 1984). Alternatively, social and emotional learning programs (SEL) should also be implemented in schools as early as possible, as they promote students’ well-being in two ways: They foster emotional and social skill-building (direct effect) and they
improve the peer support system (indirect effect) (Osher, Kidron, DeCandia, Kendziora, & Weissberg, 2016). Students with advanced social-emotional skills can identify and manage (negative) emotions in themselves and others, whilst embodying prosocial values such as kindness and therefore act with greater empathy and helpfulness (Osher et al., 2016).

Overall, as a meta-analysis of stress prevention and intervention programs in early and middle adolescence has shown, programs that specifically aim to develop socio-emotional strengths and stress management skills have an overall positive effect: participants learn to cope with stress and their perceived stress and behavioral difficulties are reduced while (social) behavior and academic performance improves (Kraag, Zeegers, Kok, Hosman, & Abu-Saad, 2006; Osher et al., 2016). These positive outcomes make a strong case for the early implementation of such programs in schools.

2.8 Strength, Limitations and Future Directions

Findings from the current study are subject to a number of limitations. First, data was collected amongst German adolescents only. Hence, future studies that include various age groups from different countries are warranted as this may identify potential cross-cultural and inter-individual differences in the associations examined. Second, the use of self-report data renders this study susceptible to socially desirable and not necessarily honest responses. However, self-report data were deemed appropriate for the current study because: (a) students’ perception were in focus, (b) internal states (i.e., perceived stress, emotions) were explored and (c) adolescents were deemed capable of expressing their internal states. Third, future studies, which include different stress definitions and variables, such as vignettes and/or acute stressors and live events, are necessary to shed a brighter light onto different stress perceptions and origins as well as the bidirectional relationship between perceived stress and socio-emotional and behavioral strengths and difficulties. Finally, future studies might use perceived stress as a mediator in the association between perceived helpfulness and
competition and socio-emotional strengths and difficulties to examine the potential effects of perceived stress.

Furthermore, limitations such as social desirability responding are not exclusive to self-report data (Chan, 2009; Spector, 2006). Nevertheless, future research could follow a multi-rater design including family members, teachers and peers. It should be noted that high numbers of indicators per factor affect the model fit negatively (cf. Ding, Velicer, & Harlow 1995; Wang & Wang, 2012). Considering the disadvantages of using single-items as opposed to building parcels the latter approach was selected for this study. However, two parcels per indicator (e.g., mediation and outcome variables) might create problems of identification at the local level. Hence, future research could include interdisciplinary designs measuring cortisol levels of students, as is common in stress research (Corominas-Roso et al., 2015; Wegner et al., 2014). In line with this, as the data of the study only consists of two waves and consequently no causal mediation results can be reported, future studies might also use more measurement points to get a deeper knowledge of the interplay of perceived stress and socio-emotional strengths and difficulties during different life spans. Moreover, some studies have used the SDQ as measure of stress, because there might be an overlap with some items (e.g., emotional problems) and a bidirectional relationship between perceived stress and socio-emotional and behavioral strengths and difficulties. However, as the correlation analysis has shown, there are no coefficients > .36. Furthermore, significant correlations with small coefficients should be interpreted with caution for such a large sample. As mentioned earlier, understanding the origins of stress perception in more depth in children could help develop specific stress prevention programs to promote children’s healthy development and lead to greater emotional strength and well-being in early and middle adolescence. Moreover, perceived stress could also be a cause of external factors, such as family conflicts, social isolation and/or low socio-economic status. These external factors should be implemented in
future studies to get a more well-grounded understanding of the origins of perceived stress
during early and middle adolescence. Hence, future studies are necessary to examine whether
helpfulness and/or competition are mediators and/or moderators in other associations, for
example in the association between perceived stress and intrinsic and/or extrinsic motivation.
Finally, due to ethical problems, different measures, sample size and different age groups it
was not possible to compare these findings with clinical studies (e.g., compare to clinical
cutoffs for mental health problems – especially regarding the effect of perceived stress on
emotional problems and symptoms of hyperactivity). Finally, as independent and moderation/
mediation variables were measured both at T1, the directionality of the paths in the SEM is
presumed to conceptual rather than causal.

Despite these limitations, the present study offers valuable insight on the interplay of
perceived stress and socio-emotional strengths and difficulties and the mediating role of
helpfulness and competition in class context based on a large sample of adolescents. It reveals
how even healthy, non-diagnosed students experience stress and its detrimental effects. In
particular, the increasingly stressful demands of modern Western societies require adequate
programs to be implemented in social contexts including schools in order to foster children’s
and young people’s healthy development as early as possible.
2.9 References


## Chapter 3—Study II

Does perceived stress moderate the association between depressive symptoms and socioemotional and behavioural strengths and difficulties in adolescence?

### 3.1 Abstract

More and more students report high level of perceived stress during childhood and adolescence, which is associated with socio-emotional and behavioral strengths and difficulties. This study aims – based on the Cognitive Vulnerability-Transactional Stress Theory – to examine perceived stress in early adolescence as a potential moderator in the association between depressive symptoms and socio-emotional and behavioral strengths and difficulties from early to middle adolescence. Results of latent moderated structural equations with questionnaire data from a longitudinal study with 1088 German students (Time 1: $M_{age} = 13.70, SD = 0.53$; Time 2: $N= 845, M_{age}= 15.32, SD = .49$) indicate that perceived stress functions as a moderator in the above-mentioned association and dominates the interaction if perceived strongly.

### 3.2 Introduction

Depressive symptoms and major depressive disorder (MDD) are significant public health concerns affecting the individual and the society as a whole, with median estimates of 1-2% of prepubescent children and 3-8% of adolescents experiencing clinical depression within a 3- to 12-month period – with approximately half of the first episodes emerging in childhood and during early adolescence (Horowitz & Garber, 2006). Hence, the prevalence of MDD and depressive symptoms are relatively low in childhood (affecting less than 1% according to most studies) and increase dramatically – as much as sixfold – during late childhood and adolescence (Hankin & Abramson, 2001; Pedrelli, Shapero, Archibald, &
Dale, 2016; Thapar, Collishaw, Pine, & Thapar, 2012). As such, about 10-15% of Americans and 350 million people worldwide suffer from MDD (Cáceda et al., 2014; Mathers, Fat, Boerma, & World Health Organization, 2008). Moreover, approximately 30% of early adolescents reported to have felt so sad that they were not able to function (Pedrelli et al., 2016).

The increasing prevalence of MDD and depressive symptoms in young people might be explained by the developmental challenges that typify adolescence, which may be of a biological (cognitive, physiological), environmental (e.g., school-transition) or social (relational) nature (Moksnes, Breadley Eilertsen, & Lazarewicz, 2016; Pedrelli, Shapero, Archibald, & Dale, 2016; Pine, & Thapar, 2012; Thapar et al., 2012). Furthermore, MDD is a major risk factor for suicide and the second-to-third leading cause of death in adolescence (Thapar et al., 2012). More than half of adolescent suicide victims reported feeling depressed prior to ending their lives (Thapar et al., 2012).

Beyond inflicting suicidal thoughts, MDD and perceived stress lead to serious social and educational problems such as negative school performance (Fröjd, Nissinen, Pelkonen, et al., 2008; Horowitz & Garber, 2006; Riglin, Thapar, Shelton, et al., 2016), an increased rate of substance abuse (e.g., cigarettes, alcohol, drugs) (Byrne & Mazanov, 2002; Horowitz & Garber, 2006), obesity (Keenan-Miller, Hammen, & Brennan, 2007), mental illnesses during adulthood, such as anxiety and/or bipolar disorders (Copeland, Shanahan, Costello, & Angold, 2009; Kim-Cohen, Caspi, Moffitt, et al., 2003; Riglin et al., 2016), negative employment histories and unemployment (Fröjd et al., 2008; Kim-Cohen et al., 2003) and/or physical health problems (Horowitz & Garber, 2006; Riglin et al., 2016; Thapar et al. 2012). Moreover, the early onset of MDD increases the risk of depressive symptoms in later adolescence and adulthood, with recurrence rates from 45-72% over 3 to 7 years (Horowitz & Garber, 2006).
Regarding the school context, possible perceived negative feedback of teachers may trigger negative thoughts of students, which in turn may lead to MDD and/or depressive thoughts (Fröjd et al., 2008). Hence, heavy workloads and pressures to perform well and achieve academic goals in the school context have been found to be associated with self-reported MDD and perceived stress (Brown, Nobiling, Teufel, & Birch, 2011; de Anda, Baroni, Boskin, et al., 2000; Fröjd et al., 2008; Moksnes, Bradley Eilertsen, & Lazarewicz, 2016), all of which increase from preadolescence to adolescence (Grützmacher & Raufelder, 2015; Moksnes, Bradley Eilertsen, & Lazarewicz, 2016; Thapar, et al., 2012).

Increasing numbers of students report high levels of perceived stress during late childhood and adolescence (American Psychological Association, 2010; Beyer & Lohaus, 2007; Lohaus, Domsch & Fridrici, 2007; Murberg & Bru, 2007; Ravens-Sieberer, Thomas & Erhart, 2003). Indeed, a survey found that one third of German elementary school students reported high and sometimes chronic stress in relation to school (Deutscher Kinderschutzbund, 2012). Such an early onset of perceived stress can induce detrimental physical symptoms such as back- or stomachaches, severe gastric ulcer (American Psychological Association, 2010), headaches, heart diseases, listlessness, obesity (Dallman, Pecoraro, Akana, La Fleur, et al., 2003), metabolic syndrome (Chandola, Brunner, & Marmot, 2006), low immunity (Kiecolt-Glaser et al., 1996; Antoni, Lutgendorf, Cole, et al., 2006) and cardiovascular diseases (Iso et al., 2002). Moreover, chronically perceived stress and a rising level of cortisol are associated with an increase in weight, osteoporosis and diabetes (Salleh, 2008). Moreover, research has shown that perceived stress, MDD and depressive symptoms are related to socio-emotional strengths (i.e., prosocial behavior – as stress exposure was found to increase trust, trustworthiness, and sharing behavior in social interactions – (von Dawans et al., 2012; Raposa, Laws, & Ansell, 2015)), behavioral difficulties (i.e., attention-deficit/hyperactivity disorder (ADHD), conduct problems (Biedermann, 2005; Corominas-
Roso et al., 2015; Molina et al., 2007, Molina & Pelham, 2014)) and emotional problems (Hammen, 2005; Hammen, Brennan, & Le Brocque, 2011; Iacovides et al., 2003).

### 3.3 Depressive symptoms, MDD and Socio-Emotional and Behavioral Strengths and Difficulties

MDD is comorbid with conduct problems (Maslowski & Schulenberg, 2013; Riglin et al., 2016) as a meta-analysis found that 22.7-83.3% of children and early adolescents with MDD also met the criteria for deviant disorder and conduct problems, and simultaneously 8.5-45.4% of children with conduct problems also met the criteria for MDD (Kofler, McCart, Zajac, et al., 2011; Wolff & Ollendick, 2006). In line with this, Stringaris, Lewis and Maughan (2014) found that over 43% of young adults with MDD had a history of misconduct in childhood or adolescence. Studies suggest that the comorbidity between MDD and misconduct reaches its’ peak in middle adolescence (Beyers & Loeber, 2003; Wolff & Ollendick, 2006). But it remains unclear whether perceived stress moderates this association, as this factor might outweigh this interplay, such as conduct problems might occur to cope temporarily with perceived stress (e.g., feeling and/or showing anger, because of being overwhelmed in a certain situation). In addition, ADHD often emerges simultaneously with psychiatric disorders such as unipolar depressive disorders (Meinzer, Pettit, & Viswesvaran, 2014). However, researchers have found contrasting results for the comorbidity of MDD and ADHD in children and adolescents (Meinzer, Pettit, & Viswesvaran, 2014) ranging from no significant association (Mannuzza, Klein, Bessler, Malloy, & LaPadula, 1998) to significantly associated (e.g., Biedermann, Ball, Monuteaux, Mick, Spencer, & McCreary, 2008).

Furthermore, Silk, Steinberg and Morris (2003) found that adolescents who struggle to regulate their emotions were more vulnerable to internalizing and externalizing problems. In contrast, the relationship between MDD, depressive symptoms and prosocial behavior is still partly unclear due to the methodological challenge of causality and directionality (Cáceda et
al., 2014). Besides this methodological lack of clarity, which needs to be solved, prosocial behavior should be taken into account as it was found to be related to other socially competent outcomes (e.g., social acceptance and approval among classmates) and hence fosters the development of academic skills by creating a positive classroom behavior and positive interactions with teachers and peers, including provisions of academic help and positive feedback (Wentzel, 2015). Moreover, prosocial behavior was found to enhance perspective taking and emotional regulation, which was found to support the development of cognitive abilities (Wentzel, 2015) and therefore can create a potential invulnerability to depressive symptoms and/or perceived stress.

3.4 Stress and MDD: The Cognitive Vulnerability-Transactional Stress Theory

Hankin and Abramson’s (2001) cognitive vulnerability-transactional stress theory considers a dynamic interaction between the individual (cognitive vulnerability and individuals’ resources to cope with perceived hassles or negative life events) and the environment (i.e., perceived stress or environmental changes such as school transitions) to explain symptoms of MDD and (later) stressful and negative life events. The authors integrated and expanded central findings from research on MDD to elaborate a reviewed cognitive vulnerability-transactional stress theory of depression. Their theory is based on the generic cognitive vulnerability-stress model (Beck, 1987; Abramson, Metalsky, & Alloy, 1989), which predicts an increased likelihood of MDD and depressive symptoms among cognitively vulnerable individuals who are faced with a negative or stressful event. In addition, MDD rates will likely increase if the individual makes negative inferences about the event, its consequences, or implications for the self (Hankin & Abramson, 2001). This theory bears similarities with the primary appraisal stage of Lazarus and Folkman’s (1984) transactional stress model, a stage in which an individual evaluates a daily hassle, event or interaction he/she is faced with as positive, negative, controllable, aversive, irrelevant or
threatening to his/her well-being (Lazarus, 1995). In contrast to the generic cognitive vulnerability-stress model, the relationship between (perceived) stress and MDD and/or depressive symptoms in the revised version is not defined as static and one-dimensional, as studies have shown that these phenomena often coincide (Compas, Howell, Phares, et al., 1989; Hankin & Abramson, 2001; Windle, 1992).

By integrating the generic vulnerability-stress model, an elaborated conceptualization of cognitive-vulnerability, interpersonal stress generation mechanisms and a developmentally sensitive model, Hankin and Abramson (2001) concluded that the relationship between stress (due to daily hassles or negative life events) and MDD must be transactional and bidirectional. Accordingly, studies with adolescents (Compas, Howell, Phares, et al., 1989; Windle, 1992) showed that strong symptoms of depression lead to later increases in the overall number of independent (events that are outside of the individual’s control, such as the death of a beloved one) and dependent (an event the individual has partly contributed to through his/her behavior and personality) negative and stressful events. Adolescents experience more dependent than independent negative life events and showed elevated symptoms of depression (Moksnes, Bradley Eilertsen, & Lazarewicz, 2016), an earlier onset of MDD, poor social skills and exhibited personality disorders, whereas preadolescents are more frequently confronted with independent negative events (e.g. Hammen, 1999; Hankin & Abramson, 2001), which highlights the importance of investigating socio-emotional and behavioral strengths and difficulties in this interplay. Following the above-mentioned theory and empirical studies the relationship between MDD, depressive symptoms and perceived stress is bidirectional and empirically associated with later socio-emotional and behavioral strengths and difficulties. What remains unclear is which of these factors have a greater impact on socio-emotional and behavioral strengths and difficulties, especially from early to middle adolescence.
Adolescence is an important period for developing coping strategies (e.g., cognitive abilities by fostering prosocial behavior, which might lead to an invulnerability to depressive symptoms and perceived stress) to deal successfully with such dependent negative life events and thereby prevent several risks and detrimental health consequences associated with depressive moods, perceived stress and socio-emotional and behavioral difficulties such as symptoms of hyperactivity, emotional problems, a lack of prosocial behavior and conduct problems. Therefore, this study examines the potential interaction effect of perceived stress and depressive symptoms in early adolescence on socio-emotional and behavioral strengths and difficulties (Goodman, 1997) in middle adolescents in a non-clinical sample. Moreover, this study wants to elaborate the cognitive vulnerability-transactional stress theory by testing the aspect of developmental sensitivity within the theory, particularly as socio-emotional strengths and difficulties can be influenced by internal (e.g., depressive symptoms) and external factors (e.g., stress) during adolescence.

**Hypothesis**

Based on the theoretical and empirical research outlined above, the aim of this study was to examine the potential moderation effect of perceived stress in the association between depressive symptoms in early adolescence and socio-emotional and behavioral strengths and difficulties in middle adolescence. Specifically, the following hypothesis was examined: Perceived stress moderates the association between depressive symptoms in early adolescence and symptoms of hyperactivity, emotional problems, conduct problems and prosocial behavior in middle adolescence.

3.5 **Method**

**Sample and Procedure**

The present study is based on a large longitudinal, quantitative questionnaire survey of students from 23 secondary schools in Brandenburg, Germany. The data were collected on
two separate occasions: First in the year 2011 (T1) when participants were early adolescent students in 8th grade (N= 1088; M_age = 13.70, SD = 0.53; 54% girls), and second 1.5 years later (2013; T2) when the same participants were in 9th grade (M_age = 15.32, SD = .49; 55% girls) and thus in the middle of adolescence. Due to the very small proportion of ethnic minority residents in Brandenburg (2.6 %) the sample could not be refined by the ethnic background of informants. Likewise, data about the socio-economic status of the students’ parents could not be collected due to German laws that prohibit asking participants to disclose personal information about another person.

Parents and students were asked for their permission to participate and were thoroughly informed about the voluntary nature of their participation. While completing the questionnaire, students were asked to sit at separate desks. The survey itself was anonymous and class-based and at least two research assistants were present to clarify any questions or uncertainties relating to specific items or the use of the Likert scale. The hypothesis of this study was tested using Latent Moderated Structural Equations (LMS) in Mplus 7.0 (Muthén & Muthén, 1998–2012).

Measures

The measures used in this survey are all well-established, validated instruments for German adolescent students. The reported Cronbach alpha values are based on the current sample.

Independent Variable: Depressive Symptoms. Depressive symptoms were measured with the German version of the Personal Health Questionnaire Depression Scale (PHQ-8), by Gräfe, Zipfel, Herzog and Löwe (2004). It showed a good Cronbach’s alpha reliability of .81 at T1. This scale features eight items including: “In the past two weeks, how often were you bothered by feeling down, depressed, or hopeless?”, and “In the past two weeks, how often were you bothered by feeling tired or having little energy?” Students were
asked to rate these eight questions on a 5-point Likert scale ranging from 1 (not at all) to 5 (almost every day).

**Moderating variable: Perceived Stress.** Perceived stress was measured using the German version of the Perceived Stress Scale by Cohen, Kamarck and Mermelstein (1983), which shows a Cronbach’s alpha reliability coefficient of .78 at T1. The Perceived Stress Scale includes nine items, such as: “In the past month, how often have you been angered by things that were outside of your control?” and “In the past month, how often have you felt that difficulties were piling up so much that you could no longer overcome them?” Students were asked to rate the nine questions on a 5-point Likert scale ranging from 1 (never) to 5 (very often).

**Dependent Variables: Socio-Emotional and Behavioral Strengths and Difficulties.**

The present study employed four subscales of the self-report version of the Strength and Difficulties Questionnaire (SDQ) by Goodman (1997). This questionnaire is principally used for assessing social, emotional and behavior functions in children aged 14-16 (Fabian, L. A., 2009). (1) First, the Emotional Symptoms Scale (here: Emotional Problems), which revealed a Cronbach alpha reliability coefficient of .73 (T2) for the present sample. The subscale consists of the following 5 items: “I get a lot of headaches, stomach-aches or feel sick”; “I worry a lot”; “I am often unhappy, downhearted or tearful”; “I am nervous in new situations”; and “I am easily scared” (Goodman, 1997). (2) Second, the Hyperactivity subscale (here: symptoms of hyperactivity), which also consists of 5 items and revealed a good Cronbach alpha reliability coefficient of .70 (T2) for the present sample. This subscale includes questions such as: “I am restless: I cannot stay still for long”; “I am easily distracted” and “I finish the work I am doing” (Goodman, 1997). (3) Third the Prosocial Behavior subscale, which measures socio-emotional and behavioral strengths, consists of 5 items and revealed a Cronbach alpha reliability coefficient of .72 (T2) for the present sample. This subscale
includes items such as: "I try to be nice to other people"; "I usually share with others"; "I am helpful if someone is hurt, upset or feeling ill" and "I am kind to younger children" (Goodman, 1997). (4) And finally, the Conduct Problems Subscale, which features a Cronbach alpha reliability coefficient of .57 (T2) and also consists of 5 items including: "I get angry and often lose my temper"; "I usually do as I am told"; "I fight a lot"; "I am often accused of lying or cheating" and "I take things that are not mine" (Goodman, 1997).

Although the Cronbach alpha value for the items measuring conduct problems was not as high as for the other subscales, parcels can be built based on Kopp and Lois’ (2012) statement that the critical value of Cronbach’s alpha is $\alpha > .50$. Participants were asked to rate all statements of the Strength and Difficulties Questionnaire on a 3-point Likert scale from 1 (do not agree) to 3 (totally agree).

3.6 Statistical Analyses

All analyses were executed using Mplus 7.0 (Muthén & Muthén, 1998-2012).

Latent Moderated Structural Equations (LMS). In order to test the hypothesis, Latent Moderated Structural Equations (LMS) were used in conjunction with robust maximum likelihood estimates to test the postulated relations between all variables of interest and to investigate latent interaction effects.

Contrary to other SEM methods, LMS takes non-linear effects into account. Furthermore, LMS accounts for non-normality within sample distributions. Accounting for non-normality is particularly important for latent dependent variables where a non-normal sample distribution is common due to the influence of interaction effects. Studies have demonstrated that LMS yields efficient parameter estimators as does a reliable model difference test, with no indication of bias of standard errors (Dimitruk, Schermelleh-Engel, Kelava, & Moosbrugger, 2007; Klein & Moosbrugger, 2000).

Due to the non-normality of the dependent variables, the $\chi^2$-values and other fit indices
cannot be assessed. For this reason, a model (model 1a) without an interaction term and algorithm has been designed to determine the model fit in the first step. Model fit was estimated in Mplus 7.0 using four primary fit indices as recommended by Hu and Bentler (1999): Chi-Square Test of Model Fit ($\chi^2$), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI) and Standardized Root Mean Square Residuals (SRMR). In order to compare model 1a without interaction terms with the final model featuring interaction terms (model 2), the integration algorithm was added to the first model (model 1b). Next, model 1b was extended through the interaction term (model 2). Model 2 was then compared to model 1b by conducting a $\chi^2$-difference test based on log likelihood values and scaling correction factors obtained with the MLR estimator (Satorra & Bentler, 2001).

In order to account for the nested structure of the data (1088 students in 71 classrooms), LMS was conducted following the type-is-complex approach (Asparouhov, 2005; Muthén & Asparouhov, 2006). This multilevel approach corrects the standard error biases created by the nested nature of the data (i.e., students in classes) (MacKinnon, 2008). To account for missing data, the models were estimated with full information maximum likelihood in Mplus.

After careful consideration of the pros and cons of parceling as opposed to reaching single-item based results, parcels were randomly built. Although this method has been the topic of controversial discussion (Marsh, Lüdtke, Nagengast, et al., 2013), as it may disguise misspecification with item parcels in confirmatory factor analysis models, the use of parcels has nonetheless proven to yield more adequate results than the single-item approach whilst reducing the bias when estimating structural parameters (Bandalos, 2002; Little, Cunningham, Shahar, & Widaman, 2002; Nasser & Wisenbaker, 2003). Little, Cunningham, Shahar and Widaman (2002) listed various reasons why working with parcels is advantageous: (1)
spurious correlations may be the outcome of estimating numerous items, (2) although they may not be of primary interest, sources of variance could be shared by a subset of items from a large item pool, (3) single-item data is less likely to produce stable results. Hence, in the present study, parceling allowed to reduce the originally large number of items, thus arguably yielding more stable results by preventing potential spurious correlations and shared sources of variance. Additionally, in their simulation study, Nasser and Wisenbaker (2003) recommended to use parcels over single items when the sample size exceeds 100 – which is the case in the current study. Subsequently, in order to test the main hypothesis, parcels were built randomly using items from the following variables: Perceived Stress, Depressive Symptoms, Symptoms of Hyperactivity, Emotional Problems, Prosocial Behavior and Conduct Problems. The random construction of parcels is, in fact, a common technique in psychological research (Marsh, Hau, Balla, & Grayson, 1998; Nasser & Wisenbaker, 2003; Prats, 1990). Subsequently, all items constituting a single variable were randomly split up into two parcels. The eight items of depressive symptoms were transformed into two parcels with four items each (DepP1T1, DepP2T1). The nine Items of the Perceived Stress Scale were transformed into two parcels consisting of five and four items respectively (STP1T1, STP2T1), whereas the five items of each of the Strengths and Difficulties Questionnaire were transformed into two parcels consisting of three and two items each (Symptoms of Hyperactivity: HypP1T2, HypP2T2; Emotional Symptoms Scale: EmoP1T2, EmoP2T2; Prosocial Behavior Scale: ProsP1T2, ProsP2T2; Conduct Problem Scale: CPP1T2, CPP2T2).

3.7 Results

Descriptive Statistics and Intercorrelations

Table 1 presents descriptive statistics (range, means, standard deviation, skewness and kurtosis) and the intercorrelations between the variables of interest (see Table 1).
Table 1

Intercorrelations between Perceived Stress, Depressive Symptoms, Emotional Problems, Conduct Problems and Prosocial Behavior in Time 1 and 2 and their Range, Means, Standard Deviations, Kurtosis and Skewness

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>M</th>
<th>SD</th>
<th>Kurtosis (SE)</th>
<th>Skewness (SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. StressT1</td>
<td>.63** .22** .36** .09* - .02</td>
<td>1-5</td>
<td>2.75</td>
<td>.56</td>
<td>.33 (.15)</td>
</tr>
<tr>
<td>2. DepT1</td>
<td>.19** .39** .07* - .04** 1-5</td>
<td>2.46</td>
<td>.74</td>
<td>.03 (.15)</td>
<td>.64 (.08)</td>
</tr>
<tr>
<td>3. HyperT2</td>
<td>- .24 .29** - .13** 1-3</td>
<td>1.81</td>
<td>.44</td>
<td>-.49 (.17)</td>
<td>.08 (.09)</td>
</tr>
<tr>
<td>4. EmoT2</td>
<td>- .24** .10** 1-3</td>
<td>1.67</td>
<td>.49</td>
<td>-.59 (.17)</td>
<td>.44 (.09)</td>
</tr>
<tr>
<td>5. ConT2</td>
<td>- -.25** 1-3</td>
<td>1.49</td>
<td>.31</td>
<td>1.50 (.17)</td>
<td>1.1 (.09)</td>
</tr>
<tr>
<td>6. ProT2</td>
<td>- 1-3</td>
<td>2.45</td>
<td>.42</td>
<td>.30 (.17)</td>
<td>-.72 (.09)</td>
</tr>
</tbody>
</table>

Note. StressT1= Perceived Stress Time 1; DepT1= Depressive Symptoms Time 1; HyperT2= Hyperactivity Time 2; EmoT2= Emotional Problems Time 2; ConT2= Conduct Problems Time 2; ProT2= Prosocial Behavior Time 2; *p < .05, ** p < .01

Latent Moderated Structural Equations (LMS)

A first model free of interaction terms and algorithms was designed to determine the model fit (model 1a). The model showed a satisfactory fit ($\chi^2$ (df= 39, N= 1088) = 107.26; $p < .001$; CFI = .99; TLI = .97; RMSEA = .04 (.03-.05); SRMR = .03). Afterwards, a numeric integration algorithm was included in model 1a resulting in model 1b. To investigate whether perceived stress would moderate the association between depressive symptoms and socio-emotional and behavioral strengths and difficulties, latent interaction terms were included in model 1b resulting in model 2. To test whether the model with (model 2) or without (model 1b) latent interaction terms represents the data better, the log-likelihood difference test was run (Satorra & Bentler, 2001). The difference test revealed a degree of significance ($\chi^2$ (df= 4, N = 1088) = 10,1247, $p < .05$), which means that the less restricted model 2 (with interaction terms) fits the data better than model 1b (without interaction terms).
**Direct Effects.** Figure 1 shows the final LMS, which was constructed to test the hypothesis. This model included longitudinal effects between depressive symptoms in early adolescence and the four subscales of the SDQ. Hence, perceived stress was included in this model as a potential predictor variable. Only one significant direct longitudinal effect was found between depressive symptoms in early adolescence and emotional problems \((B = .02, SE = .05; p < .001)\) in middle adolescence. Depressive symptoms in early adolescence did not significantly predict prosocial behavior, symptoms of hyperactivity and conduct problems in middle adolescence. Two direct effects between perceived stress in early adolescence and emotional problems \((B = .16, SE = .07; p < .05)\) and symptoms of hyperactivity \((B = .20, SE = .07; p < .01)\) were found to be significant. The results show that depressive symptoms in early adolescence only functioned as a positive predictor for emotional problems in middle adolescence but not as a positive predictor of symptoms of hyperactivity and conduct problems nor as a negative predictor of prosocial behavior in middle adolescence.
Figure 1. Latent moderated structural (LMS) of depressive symptoms, perceived stress, and emotional strengths and difficulties (symptoms of hyperactivity; emotional problems; conduct problems; prosocial behavior); T1 = first measurement point; T2 = second measurement point (1.5 years later). Significant effects shown as unstandardized coefficients (B); bold pathways are significant at *p < .05, **p < .01, and ***p < .001; dotted pathways are not significant. The covariances of constructs during the second measurement point are not reflected in the figure for clarity reasons and will be reported separately.

Covariances. The covariances between depressive symptoms and perceived stress at T1 were positive and highly significant ($r = .25; p < .001$). Specifically, the following covariances between the sets of variables were found to be positive significant: symptoms of hyperactivity and emotional problems ($r = .03; p < .001$), symptoms of hyperactivity and conduct problems ($r = .06; p < .001$), emotional problems and conduct problems ($r = .04; p < .001$), and emotional problems and prosocial behavior ($r = .02; p < .01$). Last but not least, there are significant negative associations between symptoms of hyperactivity and prosocial behavior ($r = -.02; p < .05$), as well as between conduct problems and prosocial behavior ($r = -.05; p < .001$).
**Moderation Effects.** Perceived stress functions as a moderator in the association between depressive symptoms and conduct problems \((B = -0.07, SE = 0.03; p < 0.05)\) (Fig. 2), between depressive symptoms and symptoms of hyperactivity \((B = -0.13, SE = 0.04; p < 0.01)\) (Fig. 3), as well as between depressive symptoms and prosocial behavior \((B = 0.09, SE = 0.04; p < 0.05)\) (Fig. 4). In contrast, stress does not moderate the relation between depressive symptoms and emotional problems.

*Figure 2.* The effect on conduct problems as demonstrated by the interaction between perceived stress and depressive symptoms (Dep). The Y-axis shows conduct problems. Dep = depressive symptoms.
Figure 3. The effect on symptoms of hyperactivity as demonstrated by the interaction between perceived stress and depressive symptoms (Dep). The Y-axis shows symptoms of hyperactivity. Dep = depressive symptoms.

Figure 4. The effect on prosocial behavior as demonstrated by the interaction between perceived stress and depressive symptoms (Dep). The Y-axis shows prosocial behavior. Dep = depressive symptoms.
3.8 Discussion

Based on the cognitive vulnerability-transactional stress theory (Beck, 1987; Abramson, Metalsky, & Alloy, 1989; Hankin & Abramson, 2001) the current study examined whether perceived stress moderates the association between depressive symptoms in early adolescence and socio-emotional strengths and difficulties in middle adolescence.

In line with the hypothesis, three interaction effects have been identified. As the result of LMS have shown, stress functions as moderator in the association between depressive symptoms and conduct problems. This is in line with Leadbeater, Kuperminc, Blatt, & Hertzog, (1999), who postulated that internalizing (i.e., depressive symptoms) and externalizing problems (i.e., conduct problems) often co-occur and are significantly associated during adolescence. In detail, the probability of conduct problems in middle adolescence increases with rising levels of depressive symptoms and perceived stress in early adolescence. However, with a certain degree of (high) stress, depressive symptoms become almost irrelevant. In other words, when adolescents perceive a high level of stress, their level of depressive symptoms is just a minor determinant of any conduct problems they may exhibit. This might be due to the fact that perceived stress, the inability to cope with strains/stressors during secondary appraisal – secondary appraisal describes the stage in which coping possibilities are evaluated based on intra-individual and environmental factors and in this case refers to the inexistence of coping strategies, which might help to cope with a stressful situation – (Lazarus & Folkman, 1984) and a certain cognitive vulnerability – which goes along with a negative bias – lead to negative emotions like frustration and/or anger, which in turn increase the probability of misconduct, deviant behavior or even delinquency (Agnew, 1992; Sigfusdottir, Kristjansson, & Agnew, 2012). Hence, this result supports the finding of Fergusson, Lyskey and Horwood (1996), who postulates the co-occurrence of risk factors like stressful life events for explaining the high rates of the comorbidity of MDD.
depressive symptoms and conduct problems (Maslowsky & Schulenberg, 2013).

Furthermore, the findings show that perceived stress moderates the association between depressive symptoms and symptoms of hyperactivity. Students are most likely to show symptoms of hyperactivity during middle adolescence if stress levels are high while at the same time depressive symptoms are low during early adolescence. Similar to the interaction effect between perceived stress and depressive symptoms on conduct problems, depressive symptoms have a minimal effect when adolescents are faced with high perceived stress during early adolescence. Even with high levels of depressive symptoms, students show less symptoms of hyperactivity compared to students with high levels of stress. In other words, there seems to be a strong association between perceived stress and symptoms of hyperactivity. This finding sheds light onto the association between perceived stress and symptoms of hyperactivity, which was shown to be reciprocal (Corominas-Roso et al. 2015), and onto the ambiguous results of studies on MDD and ADHD (Biederman et al., 2008; Meinzer, Pettit, & Viswesvaran, 2014). In detail, this finding shows that preventing stress in early adolescence is an essential mechanism for preventing hyperactive behavior/symptoms in middle adolescence. In addition, adolescents who are not depressed and perceive less stress in early adolescence tend to show the highest probability of prosocial behavior in middle adolescence. In detail, the probability of prosocial behavior in middle adolescence decreases with rising levels of depressive symptoms and perceived stress. Again, with a certain degree of (high) stress, depressive symptoms become almost irrelevant. This is in line with Larson and Moses’ (2014) finding that the exposure to stress in adolescence is associated with a later erosion of prosocial behavior. This result also indicates that a high level of perceived stress (and depressive symptoms) in early adolescence prevented students to develop a higher level of prosocial behavior, which would have supported the development of cognitive abilities (i.e., cognitive invulnerability) to cope with stressful situations or depressive symptoms in
middle adolescence. Contrary to the hypothesis, perceived stress does not moderate the relationship between depressive symptoms and emotional problems. Both perceived stress and depressive symptoms in early adolescence contribute to increased emotional problems (but do not interact) in middle adolescence as an additive and not a moderated pathway. Put simply, both perceived stress and depressive symptoms contribute to emotional problems, and when both are present during early adolescence, emotional problems are even more pronounced during middle adolescence. This might be explained through the overlap of the two constructs. MDD and depressive symptoms are defined as an emotional internalizing disorder characterized by the inability to reduce negative emotions like sadness and maintain positive emotions, and mood disorder (Silk, Steinberg, & Morris, 2003).

Overall, the findings support the cognitive vulnerability-transactional stress theory, as both perceived stress and depressive symptoms are transactional and bidirectional (Hankin & Abramson, 2001). Moreover, the results indicate that this bidirectional relationship does also have effects on later socio-emotional and behavioral strengths and difficulties. However, the results show that perceived stress dominates the interaction when it is perceived strongly. This in turn highlights the importance of reducing stress by fostering coping skills (i.e., working on the individual level) and by creating a positive classroom climate (i.e., working on the contextual level) – e.g., teachers might foster and appreciate students’ prosocial behavior and their positive emotions, which in turn leads to a positive classroom climate and was found to be associated with positive interactions between teachers and peers (Wentzel, 2015). In addition, stress prevention and intervention programs, such as CEPIDEA (Promoting Prosocial and Emotional Skills to Counteract Externalization Problems in Adolescence), should be implemented in schools as early as possible to counteract students’ aggressive conduct and to enhance their academic achievement during adolescence (Caprara et al., 2014). In sum, fostering a positive classroom climate, coping skills and emotional regulation
strategies as early as possible during early adolescence can be most effective to prevent socio-emotional and behavioral difficulties for middle adolescent students.

3.9 Strength, Limitations and Future Directions

As with any study some strengths and limitations do apply. The major strength is the large sample size, albeit future studies might expand the sample even further by considering different age groups or countries to elaborate on the effects of age and cross-cultural differences on MDD, depressive symptoms and/or perceived stress. Another strength of this study is the longitudinal design, which made it possible to highlight the bidirectional and transactional relationship between depressive symptoms and perceived stress based on the Cognitive Vulnerability-Transactional Stress Theory (Hankin & Abramson, 2001).

One limitation of this study is the use of self-report data, which opens the possibility that adolescent informants responded according to what they perceive to be socially desirable responses. However, self-report data were appropriate for the current study for three reasons: (1) students’ perception were in focus, (2) internal states (i.e., perceived stress, depressive symptoms and socio-emotional strengths and difficulties) were explored and (3) adolescents were deemed capable of expressing their internal states. In addition, adolescent students were not diagnosed with MDD or ADHD by experts or other raters and symptoms of hyperactivity (i.e., inattention and task completing) might also be present when showing depressive symptoms, which is another limitation of this study. Future studies might take this into account by refining these constructs and their associations.

Hence, potential cognitive vulnerability could not be measured. Future studies, including clinical measures, are necessary to include this aspect as a potential variable in this association. Furthermore, the omission of gender differences presents another limitation. Nevertheless, some studies postulate that gender differences in MDD only truly unfold after adolescence, for instance when girls allegedly tend to suffer from higher rates of MDD than
boys (Riglin et al., 2016). In addition, as the aim of this study was to elaborate and test the Cognitive Vulnerability-Transactional Stress Theory – especially the aspect of developmental sensitivity within the theory, the bidirectional relationship between depressive symptoms and perceived stress and the potential moderation effect of perceived stress –, gender and age were not included into the analyses, although studies postulate gender and age differences for showing externalizing and internalizing strengths and problems (i.e., conduct problems, emotional problems, symptoms of hyperactivity, stress-response and prosocial behavior). Future studies are necessary to refine the associations between externalizing and internalizing problems by age and gender during adolescence and moreover in the transition into adulthood.

Furthermore, the potential negative bias caused by emotional mood disorder or cognitive vulnerability could have falsified the results. Hence, future research might consider intra-individual coping strategies, various anxiety disorders, cross-legged-designs, mixed-methods and interdisciplinary designs to shed a brighter light onto the relationship between depressive symptoms and perceived stress in early adolescence and socio-emotional and behavioral strengths and difficulties in middle adolescence. In addition, it remains unclear whether stress events are experienced personally or are merely observed occurring to others. Therefore, future studies are warranted that examine this interplay over a larger timeframe and in greater detail. Nevertheless, this study highlights the importance of preventing stress in early adolescence, as it is associated with detrimental outcomes in middle adolescence.
3.10 References


Chapter 4—Study III
The Interplay of Emotional Instability and Socio-Environmental Aspects of Schools during Adolescence

4.1 Abstract

According to Bronfenbrenner’s socio-ecological model, school is an essential microsystem of the developing child. Schools provide important developmental contexts for children and adolescents, as they constitute environments that might either foster or evoke students’ emotional instability. In particular, less is known about the precise and dynamic interplay of students’ socio-environmental aspects in school (i.e., sense of school belonging, social relationships with teachers and peers) and emotional instability (i.e., depressive symptoms, perceived stress, feelings of loneliness) during adolescence. To close this gap, this study examined within- and over-time cross-lagged associations based on data from a quantitative questionnaire-based survey of adolescent students (T1: N= 1088; Mage = 13.70, SD = 0.53) from 23 secondary schools in Brandenburg, Germany. Results of latent cross-lagged panel design supports the mutual relations for within-time associations, which is in line with Bronfenbrenner’s model. However, only the over-time association between school belonging and teacher-student relationship was found to be reciprocal.

4.2 Introduction

Schools provide one of the most important developmental contexts for children and adolescents, as their environment not only influences students’ academic but also their socio-emotional and behavioral development (Hanish et al., 2016; Pittman & Richmond, 2007). In detail, schools can be seen as one of the most important microsystem of the developing child (Bronfenbrenner, 1975, 1979, 1989; Bronfenbrenner & Ceci, 1994) and as a social institution that creates an environment, which can either evoke or alleviate perceived stress during
adolescence by either increasing individual’s perception of perceived stress or by helping students reduce stress by fostering their coping resources (Chahal & Ewen, 2014). In addition, during the school transition from elementary to middle and then to high school, students must readapt to different classroom contexts, a process that is characterized by (social) stress and occurs during a time generally characterized by low emotional stability (Hanish et al., 2016). In sum, less is known about the precise and dynamic interplay of students’ socio-environmental aspects in school (i.e., sense of school belonging, social relationships with teachers and peers) and emotional instability (i.e., depressive symptoms, perceived stress, feelings of loneliness). Therefore, this study aims to shed light on this essential and dynamic interplay between emotional stability and socio-environmental aspects during adolescence.

Following Bronfenbrenner’s bio-socio-ecological model (Bronfenbrenner, 1975, 1979, 1989; Bronfenbrenner & Ceci, 1994), the developing child participates in many different microsystems (i.e., family, school, relationships with peers and teachers) in its proximal environment, which in sum constitute a child’s mesosystem (Bronfenbrenner & Morris, 1998). This microsystem and its reciprocal interaction (mesosystem) is an essential (positive and/or negative) factor for a child’s development. Particularly, in adolescence the school context is one of the most important socio-environmental factor, as students spend an enormous amount of time in school. Accordingly, school does not only build an educational area, but rather an important influence factor on student’s development (Harter, 1996; Wigfield & Eccles, 2001).

“This gives a responsibility for development of resilience to the community, and encompasses also the school system as one of the most important systems for children and young people. Environmental and social contexts of a young person make it possible to work simultaneously on reducing risk factors and promoting protective factors” (Kiswarday, 2012, p. 94).
Adolescence is a key developmental period, which involves biological, psychological and social changes, including challenging academics, extracurricular activities, challenging relationships, emotional sensitivity and shifting self-concepts (Moksnes, Bradley Eilersten, & Lazarewicz, 2016; Williams, Turner-Henson, Davis, & Soistmann, 2017). Specifically, adolescents experience a broader range of emotions with much stronger intensity and mood states than adults (Van Roekel et al., 2015), a phenomenon that is associated with socio-emotional development and changing relationships (Engels et al., 2016). In other words, the risk for emotional instability increases enormously with the onset of puberty, which is in line with research that found the greatest emotional instability to manifest itself between childhood and early adolescence (Larson, Moneta, Richards, & Wilson, 2002).

Depressive symptoms and major depressive disorder (MDD), with a prevalence ranging from 1-27% during adolescence (Maurizi et al., 2013), are associated with higher risks of developing emotional instabilities, such as depressive disorders in adulthood, a thirty-fold increased risk of committing suicide (Horowitz & Garber, 2006; Werner-Seidler, Perry, Calear, Newby, & Christensen, 2017; Williams et al., 2017), flawed social relationships, deviant behavior, and scholastic difficulties (Lombas et al., 2014; Williams et al., 2017). Therefore, MDD and depressive symptoms can be seen as significant individual and public health concerns affecting students’ daily lives (i.e., in the school context) (Horowitz & Garber, 2006; Williams et al., 2017). MDD and/or depressive symptoms are positively associated with perceived stress, which can be perceived individually (e.g., increased perception of stressful life events, fights with friends, feeling excluded by peers) or cumulatively by being exposed to different types of stressful events (e.g., lost friendships or rejection) during a specific time period (Agoston & Rudolph, 2016; Moksnes, Bradley Eilersten, & Lazarewicz, 2016; Van Roekel et al., 2015). These empirical findings highlight
the positive relationship between (chronic) life stress and depressive symptoms (see Lombas et al., 2014), thereby the association between perceived stress and depressive symptoms is understood to be bidirectional, as depressive symptoms can also foster perceived stress (Hankin & Abramson, 2001).

In addition, the feeling of loneliness, is defined as an unpleasant state that emerge due to a discrepancy between interpersonal relationships people want to have and those they perceive (Qualter et al., 2013; Vanhalst, Goossens, Luyckx, Scholte, & Engels, 2013; Vanhalst, Luyckx, & Goossens, 2014; Van Roekel et al., 2015) and affects an individual’s emotional state negatively: It has been found to be associated with poor social, behavioral, and health outcomes from childhood to adulthood (Qualter et al., 2013; Vanhalst, Luyckx, & Goossens, 2014; Woodhouse, Dykas, & Cassidy, 2012). Studies have also found that the chronic experience of loneliness causes psychological and physiological strains (stress), which in turn increases students’ risk of emotional disorders later in life (see Qualter et al., 2013). Hence, not only is loneliness associated with psychological and physiological stress, but it also contributes to a higher perception of stress in everyday life. This in turn might lead to depressive symptoms and a broad range of other somatic and psychological disorders and symptoms (see Qualter et al., 2013). Moreover, studies have found loneliness and a high level of depressive symptoms to be related with a decrease in grades and achievement in school (see Maurizi et al., 2013). In sum, existing research has shown that the above-mentioned aspects of emotional instability (i.e., depressive symptoms, perceived stress and loneliness) are positively, concurrently and longitudinally associated, indicating bidirectional relations.

The interplay between emotional instability and socio-environmental aspects in school

Considering that a child’s emotional instability might be a result of reciprocal relations between different microsystems (Bronfenbrenner, 1979, 1989; Bronfenbrenner & Morris, 1998), which in sum constitutes a child’s mesosystem, the role of socio-environmental aspects
School Belonging. School belonging can be defined as a feeling of connectedness to one’s school or educational institution and, perhaps more importantly, a feeling of fitting in with other members of the same school (Pittman & Richmond, 2007). Researchers have found a positive sense of school belonging to be associated with better academic achievement, a better grade point average, lower rates of school drop-out and better socio-emotional and behavioral functioning (Pittman & Richmond, 2007). Specifically, school belonging was found to be associated with lower probability of MDD and/or depressive symptoms and loneliness (see Maurizi et al., 2013; Pittman & Richmond, 2007). Moreover, studies have shown that teacher support and students’ engagement in class were positively associated with students’ sense of (school) belonging, which in turn was related with scholastic commitment and achievement. In contrast, lower levels of teacher support were found to be associated with greater odds of depressive symptoms among students (see Maurizi et al., 2013).

Relationships with Teachers. The quality of the teacher-student relationships (TSR) is essential for developmental outcomes. A negative TSR is characterized by higher levels of teacher-student conflicts and a lack of emotional security, which was found to be associated with students’ academic, socio-emotional and behavioral difficulties (see Engels et al., 2016). In turn, a positive and supportive TSR is characterized by warmth, sensitive and responsive interactions. It contributes to students’ academic, socio-emotional and behavioral development and well-being (Baker, Grant, & Morlock, 2008; De Laet et al., 2016; Engels et al., 2016; Maurizi, Grogan-Kaylor, Granillo, & Delva, 2013). This relationship was found to be bidirectional such that students’ well-being also contributes to a positive TSR (De Laet et al., 2016). Following this, adolescents perceiving a positive TSR experience less emotional instability, have more resources for their learning activities (Baker, Grant, & Morlock, 2008).
and may experience a higher level of belonging to their immediate educational context (Engels et al., 2016).

Relationships with Peers. During adolescence, particularly during the transition from early to middle adolescence, individuals typically seek greater independence from their parents, while peers and teachers become more essential (Persike & Seiffge-Krenke, 2014; Raufelder, 2007; Teppers et al., 2013; Van Roekel, 2015; Wentzel & Muenks, 2016). However, negative peer relationships can be a greater risk of an unhealthy development (Reynolds & Crea, 2015): Research has shown that peer rejection was linked to loneliness, perceived stress and depressive symptoms (see Williams et al., 2017; Woodhouse, Dykas, & Cassidy, 2012) and a stronger desire to avoid school (i.e., low sense of school belonging) (Wentzel & Muenks, 2016). For decades, research has exclusively focused on individual risk factors to explain adolescents’ MDD and depressive symptoms, yet recent studies suggest that peer groups and socio-environmental networks play an important role for explaining MDD and depressive symptoms in adolescence and adulthood (Reynolds & Crea, 2015), as strong peer support was found to be associated with reduced depressive symptoms (see Maurizi et al., 2013).

Moreover, studies have found that children who experience consistently low levels of loneliness showed the highest levels of positive peer interactions compared to children experiencing increasing levels of loneliness (see Vanhalst et al., 2013). As relationships during adolescence undergo lasting changes, individuals are said to experience less loneliness from middle to late adolescence (Vanhalst et al., 2013). This is in line with studies, which found that loneliness was relatively stable and reached its’ peak at the age of 13, but then decreases (see Qualter et al., 2013). However, since not all individuals are able to establish and experience positive peer and/or teacher relationships and intimacy, adolescent students might differ in their development and perception of loneliness (Vanhalst et al., 2013).
When, in addition to loneliness, students also perceive rejection by their peers, they report a high amount of perceived stress (Persike & Seiffge-Krenke, 2014; Williams et al., 2017). Accordingly, studies have shown over half of adolescents to report peer rejection as the major stressor related to peer-context, highlighting negative outcomes of peer-relationships (see Persike & Seiffge-Krenke, 2014). In turn, students perceiving emotional support from their peers tend to report a positive student-student relationship (SSR), feel less lonely, emotionally distressed and/or show less depressive symptoms (see Wentzel & Muenks, 2016). In addition, positive friendships with peers can serve as a haven from perceived daily stress and as a protective factor for students’ emotional instability in school and/or the family home (Persike & Seiffge-Krenke, 2014).

In sum, existing research provides evidence that aspects of emotional instability (i.e., depressive symptoms, perceived stress and loneliness) are associated with socio-environmental aspects in school context, such as the quality of TSR, SSR and students’ sense of belonging. The above mentioned empirical results highlight the importance of intervention-and prevention programs in school, which a) focus on socio-emotional level (i.e., school environment) by creating a safe, supportive environment, which is characterized by a positive relationship between teachers and students, as well as students and students, and b) focus on individual level and students’ emotional functioning (e.g., emotional functioning coaching) (Olsson et al., 2003).

However, less is known whether these associations are reciprocally related within and over-time. To fill this research gap, the current study was conceptualized including both aspects of emotional instability and aspects of socio-environment during adolescence.

4.3 Current Study

Based on the above-mentioned research and according to Bronfenbrenner’s socio-ecological model (Bronfenbrenner, 1975, 1979, 1989; Bronfenbrenner & Ceci, 1994) this
The study aims to shed light on the precise dynamic interplay of aspects of emotional instability (i.e., depressive symptoms, perceived stress, loneliness) and socio-environmental aspects of school (i.e., school belonging, TSR, SSR) from early to middle adolescence. Particularly, the question arises whether the variables of interest are reciprocally associated concurrently and longitudinally. In detail, the following hypotheses were tested:

Depressive symptoms in early adolescence are positively, concurrently and longitudinally associated with other aspects of emotional instability (i.e., perceived stress and loneliness) and negatively associated with socio-environmental aspects of school (i.e., sense of school belonging, TSR and SSR) in middle adolescence.

Perceived stress in early adolescence is positively, concurrently and longitudinally associated with other aspects of emotional instability (i.e., depressive symptoms and loneliness) and negatively associated with socio-environmental aspects of school (i.e., sense of school belonging, TSR and SSR) in middle adolescence.

Loneliness in early adolescence is positively, concurrently and longitudinally associated with other aspects of emotional instability (i.e., depressive symptoms and perceived stress) and negatively associated with socio-environmental aspects of school (i.e., sense of school belonging, TSR and SSR) in middle adolescence.

The sense of belonging in early adolescence is positively, concurrently and longitudinally associated with other socio-environmental aspects of school (i.e., TSR and SSR) and negatively associated with aspects of emotional instability (i.e., depressive symptoms, perceived stress and loneliness) in middle adolescence.

TSR in early adolescence is positively, concurrently and longitudinally associated with other socio-environmental aspects of school (i.e., sense of school belonging and SSR) and negatively associated with aspects of emotional instability (i.e., depressive symptoms, perceived stress and loneliness) in middle adolescence.
SSR in early adolescence is positively, concurrently and longitudinally associated with other socio-environmental aspects of school (i.e., sense of school belonging and TSR) and negatively associated with aspects of emotional instability (i.e., depressive symptoms, perceived stress and loneliness) in middle adolescence.

To consider the stability of each construct, direct effects of each variable between T1 and T2 were additionally included.

4.4 Method

Sample and Procedure

The present study is based on data retrieved through a large longitudinal, quantitative questionnaire survey, examining Socio-Emotional Learning Factors (SELF-Project) of students from 23 randomly selected secondary schools in Brandenburg, Germany. Five schools were located in the largest cities (Frankfurt (Oder), Potsdam, Cottbus, Prenzlau, Brandenburg), whereas 18 schools were located in rural areas in the federal state of Brandenburg. Assessments were administrated in 2011 (T1) and 1.5 years later (T2) with the same participants. The first measurement time (T1) included students in their early adolescence (N = 1088; \( M_{\text{age}} = 13.70, SD = 0.53; 53.9\% \) girls); the same students we re-examined once they entered middle adolescence at the second measurement time (T2) (\( M_{\text{age}} = 15.32, SD = .49; 55\% \) girls). The drop-out rate between T1 and T2 was 22.23%. Initially, the government’s Department of Education, Youth and Sport for Brandenburg and the participating schools gave their formal approval to conduct the study. Data were collected by two trained research assistants who also gave detailed instructions on how to complete the questionnaires using Likert scales. In an attempt to reduce the risk of students responding with what they held to be socially desirable responses, all participants were informed that researchers were only interested in their personal thoughts and emotions and that there were neither right, nor wrong answers. Prior to the assessments, parents and students were asked for their permission to participate and were
thoroughly informed about the voluntary nature of their participation. The survey itself was pseudo-anonymous at T1 and fully anonymous at T2. The students completed the paper-pencil questionnaires in the classroom and were asked to sit separately. Hence, ethic background data were not collected as the percentage of ethnic minorities in the federal state of Brandenburg is low (2.6%). Moreover, socio-economical aspects were not considered due to German law, which does not allow to provide personal information about third persons (i.e., parents). The research was conducted in compliance with APA ethical standards.

Measures

The following measures used in the survey are all well-established, validated instruments for German adolescent students.

Depressive Symptoms. Depressive Symptoms were measured using the German version of the Personal Health Questionnaire Depression Scale (PHQ-8) by Gräfe, Zipfel, Herzog and Löwe (2004). It showed a satisfactory Cronbach’s alpha reliability of .81 at T1 and .82 at T2. This scale includes eight items addressing students’ feelings of worry and/or sadness over the past 14 days. Students had to rate the questions on a five-point Likert scale ranging from one (not at all) to five (almost every day).

Perceived Stress. Perceived stress was measured using the German version of the Perceived Stress Scale by Cohen, Kamarck and Mermelstein (1983), which showed a good Cronbach’s alpha reliability coefficient of .78 at T1 and .80 at T2. The Perceived Stress Scale includes nine items which interrogate students about feeling nervous and/or overwhelmed by situations or the perceived ability to cope with difficult situations over the past month. Students had to rate each of the nine questions on a five-point Likert scale ranging from one (never) to five (very often).

Loneliness. Loneliness was measured using the German version of the UCLA Loneliness Scale by Schwab (1997), which showed a good Cronbach’s alpha reliability
coefficient of .83 at T1 and .90 at T2. This scale includes ten items asking students about their perceived loneliness (e.g., feeling unhappy because nobody talked to them or because they had to do many things by their own). Students were asked to rate these statements from one (never) to four (often).

**Belonging.** This variable originates from the Program for International Student Assessment (PISA) of the Organization for Economic Cooperation and Development (OECD) (Kunter et al., 2002). The scale revealed a Cronbach’s alpha reliability coefficient of .78 at T1 and .80 at T2. This scale includes eight items which interrogate students about their experiences of social exclusion in and their sense of belonging to school. Students were asked to rate the statements from one (strongly disagree) to four (strongly agree). **TSR.** This variable originates from the Program for International Student Assessment (PISA) of the Organization for Economic Cooperation and Development (OECD) (Kunter et al., 2002). It was measured using five items and showed a good reliability of α= .78 at T1 and .76 at T2. The items were introduced as follows: “Please think of the teachers in your school. How much do you agree with the following statements”? Statements included: “Most teachers think it is important that their students feel good”, and “Most of the teachers are interested in what I have to say”. Students were asked to rate these statements from one (strongly disagree) to four (strongly agree).

**SSR.** This variable also originates from the Program for International Student Assessment (PISA) of the Organization for Economic Cooperation and Development (OECD) (Kunter et al., 2002). It includes six items and revealed a satisfactory Cronbach’s alpha of .69 at T1 and .70 at T2. This scale specifically focuses on the classroom context and addresses students’ perceptions of their relationships with other students (e.g., jealousy if someone gets a good grade). Students were asked to rate these statements from 1 (strongly disagree) to 4 (strongly agree).
Statistical Analyses

The longitudinal association between perceived stress, depressive symptoms, belonging, loneliness, TSR and SSR from early to middle adolescence were examined using a latent cross-lagged SEM research design in Mplus 7.2 (Muthén & Muthén, 1998-2012). Initially, confirmatory factor analyses (CFA) were run in Mplus in order to test measurement invariance. In preparation for the CFA, parcels were randomly built to reduce the number of items and thus create more stable results by preventing potential doubtful correlations and shared variance (Little, Cunningham, Shahar, & Widaman, 2002; Little, Rhemtulla, Gibson, & Schoemann, 2013; Marsh, Hau, Balla, & Grayson, 1998; Nasser F., & Wisenbaker, 2003; Prats, 1990; Sterba & Rights, 2017). In detail, the eight items measuring depressive symptoms were transformed into two parcels consisting of four items each (DepP1T1 and DepP2T1 for T1 and DepP1T2, DepP2T2 for T2). The nine items of the Perceived Stress Scale were randomly transformed into two parcels consisting of five and four items each (STP1T1, STP2T1 for T1 and STP1T2, STP2T2 for T2). The ten items on the loneliness scale were transformed into two parcels with five items each (LOP1T1, LOP2T1 for T1 and LOP1T2, LOP2T2 for T2). The eight items subsumed in the belonging scale were also transformed into two parcels consisting of four items each (BELP1T1, BELP2T1 for T1 and BELP1T2, BELP2T2 for T2). In addition, the five items of TSR were transformed into two parcels consisting of three and two items (LVP1T1, LVP2T1 for T1 and LVP1T2, LVP2T2 for T2). Finally, the six items of SSR were also randomly split into two parcels with three items each (SVP1T1, SVP2T1 for T1 and SVP1T2, SVP2T2 for T2).

To evaluate the model fit the following fit indices were used: chi-square likelihood ratio statistic, root mean square error of approximation (RMSEA), comparative fit index (CFI), Tucker–Lewis fit index (TLI), and the standardized root mean square residual (SRMSR). Adequate model fit is indicated by CFI and TLI values ≥ 0.90, and RMSEA and SRMR values...
of ≤ 0.08, whereas a good model fit is indicated by CFI and TLI values ≥ 0.95 and RMSEA values ≤ 0.06 (Hu & Bentler, 1999; Kline, 2005). Due to the large sample size, the chi-square value did become significant and therefore cannot be interpreted adequately.

As the data of the study were nested (1088 students in 71 classrooms at T1, and 845 students in 67 classrooms at T2), cross-lagged SEM was conducted using the type-is-complex approach established by Asparouhov (2005) for complex survey data (Asparouhov & Muthén, 2006). This approach corrects the standard error biases created by the nested nature of the data (i.e., students in classes) (MacKinnon, 2008). In order to test whether the missing values are completely at random, Little’s missing completely at random (MCAR) test was estimated (Little, 1988). As the results for the final model were not found to be significant, the hypothesis could not be rejected, meaning that missing values in this study were completely at random. For this reason, the randomly missing data values were handled using full-information maximum likelihood estimation (FIML) in Mplus 7.2. All assumptions for FIML were tested and confirmed.

4.5 Results

Descriptive Statistics and Intercorrelations

The following table (see Table 1) shows the intercorrelations between the variables of interest, as well as their means (M), range, standard deviation (SD), kurtosis with standard deviation and their skewness and standard deviation values.
Table 1

*Intercorrelations between Depressive Symptoms, Perceived Stress, Loneliness, Belonging, Student-Student-Relationship and Teacher-Student-Relationship in T1 and T2, as well as their Range, Means, Standard Deviations, Kurtosis and Skewness values*

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<td>.67**</td>
<td>.27**</td>
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*Note.* Dep= Depressive Symptoms; Stress= Perceived Stress; LO= Loneliness; BEL= Belonging; SSR= Student-Student-Relationship; TSR= Teacher-Student-Relationship; T1= Time 1 (2011), T2= Time 2 (2013); ** p < .001
Before conducting the cross-lagged SEM, confirmatory factor analyses (CFA) were run to prove measurement invariance (see Table 2), supporting the assumption that the constructs remained stable over time and therefore, favoring the use of a cross-lagged SEM design (Geiser, 2010). The CFA of strong measurement invariance over time showed a good model fit ($\chi^2_{186} = 374.93, p < .001; CFI = .98, TLI = .97, RMSEA = .03 (.03-.04); SRMR = .02$).

<table>
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<tr>
<th>Step</th>
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<td>.026-.035</td>
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<tr>
<td>Model 1</td>
<td>8.95</td>
<td>.18</td>
<td>6</td>
<td>192</td>
<td>384.18</td>
<td>&lt;.001</td>
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<td>.030</td>
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<tr>
<td>Model 2</td>
<td>9.33</td>
<td>.16</td>
<td>6</td>
<td>198</td>
<td>392.67</td>
<td>&lt;.001</td>
<td>.98</td>
<td>.97</td>
<td>.030</td>
<td>.026-.034</td>
<td>.038</td>
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</tbody>
</table>

*Note.* Model 0 = configural measurement invariance; Model 1 = weak measurement invariance; Model 2 = strong measurement invariance.

Cross-Lagged SEM

The Cross-Lagged-SEM includes over-time associations (direct and cross-lagged paths) between each variable from T1 to T2, as well as within-time associations between all variables at T1 and all variables at T2. The final Cross-Lagged-SEM showed a good fit ($\chi^2_{198} = 392.67, p < .001; CFI = .98, TLI = .97, RMSEA = .03 (.03-.04), SRMR = .04$).

*Within-time associations.* The within-time associations between all variables of emotional instability are positive and significant. In detail, the association between depressive symptoms and loneliness (T1: $r = .18/ .53; p < .001$; T2: $r = .17/ .53; p < .001$) and between depressive symptoms and perceived stress (T1: $r = .25/ .76; p < .001$; T2: $r = .20/ .72; p < .001$), as well as the within-time associations between perceived stress and loneliness (T1: $r = .12/ .51; p < .00$; T2: $r = .11/ .50; p < .001$) are positive and highly significant. In contrast, all
within-time associations between the socio-environmental factors are positive and significant: In detail, the associations between belonging and SSR (T1: \( r = .11/-.46; p < .001 \); T2: \( r = .05/-.30; p < .001 \)) and teacher-student relationship TSR (T1: \( r = .18/-.41; p < .001 \); T2: \( r = .04/-.33; p < .001 \)) are positive and significant, whereas the association between SSR and TSR is only positive and significant during early adolescence (T1: \( r = .06/-.28; p < .001 \)).

Last but not least, all associations between emotional instabilities and socio-environmental factors are negatively and significantly associated: The within-time associations between depressive symptoms and belonging (T1: \( r = -.16/-.48; p < .001 \); T2: \( r = -.08/-.34; p < .001 \)), between depressive symptoms and SSR (T1: \( r = -.12/-.33; p < .001 \); T2: \( r = -.06/-.19; p < .001 \)) and between depressive symptoms and TSR (T1: \( r = -.11/-.37; p < .001 \); T2: \( r = -.06/-.27; p < .001 \)), as well as the associations between belonging and loneliness (T1: \( r = -.16/-.64; p < .001 \); T2: \( r = -.10/-.51; p < .001 \)) and between belonging and perceived stress (T1: \( r = -.10/-.41; p < .001 \); T2: \( r = -.05/-.30; p < .001 \)), but also the relations between perceived stress and SSR (T1: \( r = -.08/-.31; p < .001 \); T2: \( r = -.04/-.21; p < .001 \)) and between perceived stress and TSR (T1: \( r = -.07/-.36; p < .001 \); T2: \( r = -.04/-.24; p < .001 \)), and the association between loneliness and SSR (T1: \( r = -.10/-.38; p < .001 \); T2: \( r = -.08/-.38; p < .001 \)) and between loneliness and TSR (T1: \( r = -.04/-.36; p < .05 \); T2: \( r = -.03/-.19; p < .001 \) ) are negatively associated.

Over-time associations: Direct effects. As Figure 1 shows, depressive symptoms in early adolescence and middle adolescence (\( B = .53, SE = .08, \beta = .49; p < .001 \)), belonging during early and middle adolescence (\( B = .38, SE = .08, \beta = .39; p < .001 \)), perceived stress in early and middle adolescence (\( B = .26, SE = .08, \beta = .24; p < .05 \)), loneliness in early and middle adolescence (\( B = .53, SE = .08, \beta = .45; p < .001 \)), SSR in early and middle adolescence (\( B = .55, SE = .08, \beta = .55; p < .001 \)) and TSR in early and middle adolescence (\( B = .52, SE = .07, \beta = .52; p < .001 \)) are all positively associated, which indicates the stability of each construct over time.
Figure 1. Cross-Lagged-SEM of Depressive Symptoms (DEP), Perceived Stress (Stress), Loneliness, Belonging, Student-Student-Relationship (SSR) and Teacher-Student-Relationship (TSR) T1= first measurement point; T2= second measurement point (1.5 years later). Significant effects shown as unstandardized coefficients (B), standardized coefficients () are shown in italics; bold pathways are significant at *p < .05; non-significant effects are not shown in the figure for clarity reasons; The covariances of constructs during T1 and T2 are also not reflected in the figure for clarity reasons and will be reported separately.

Over-time associations: Cross-Lagged-Effects. In sum, six cross-lagged effects are found to be significant. First, depressive symptoms in early adolescence are positively associated with perceived stress in middle adolescence (B= .23, SE= .06, β= .31; p <.001). Second, school belonging in early adolescence is positively associated with both perceived stress (B= .15, SE= .08, β= .14; p <.05) and TSR (B= .12, SE= .06, β= .14; p <.05) in middle adolescence. Third, loneliness in early adolescence is positively associated with TSR (B= .14, SE= .05, β= .17; p <.05) and negatively associated with belonging (B= −.17, SE= .07, β= −
.18; \( p < .05 \) in middle adolescence. Finally, TSR in early adolescence is positively associated with school belonging (\( B = .18, SE = .06, \beta = .16; p < .05 \)) in middle adolescence.

4.6 Discussion

According to Bronfenbrenner’s socio-ecological model (Bronfenbrenner, 1975, 1979, 1989; Bronfenbrenner & Ceci, 1994), this study aimed to examine the precise microsystems-interplay of socio-environmental aspects of school (i.e., students’ sense of school belonging, social relationships with teachers and peers) and aspects of emotional instability (i.e., depressive symptoms, perceived stress, feelings of loneliness) from early to middle adolescence using cross-lagged SEM.

The results support hypothesis I partly: Within time, all relationships between depressive symptoms and the other aspects of emotional instability were found to be significant. In detail, a bidirectional relationship between depressive symptoms and perceived stress (Hankin & Abramson, 2001; Lombas et al., 2014) as well as between depressive symptoms and loneliness (see Quarter et al., 2013) was found. In addition, the cross-lagged association between depressive symptoms in early adolescence and perceived stress in middle adolescence was found to be positive. Put simply: Students with stronger depressive symptoms in early adolescence experience higher levels of perceived stress in middle adolescence. This is in line with studies on adolescents (Compas, Howell, Phares, Williams, & Giunta, 1989; Windle, 1992), showing that depressive symptoms – amongst other variables – increase the overall number of negative and stressful events experienced at a later time in life (Cohen, Burt, & Bjorck 1987; Compas, Howell, Phares, Williams, & Giunta, 1989; Hankin & Abramson, 2001; Moksnes, Bradley Eilersten, & Lazarewicz, 2016; Windle, 1992). Nevertheless, this finding stands in contrast to research postulating a bidirectional relationship between depressive symptoms and perceived stress over time (see, e.g., Hankin & Abramson, 2001), as no significant cross-lagged effect was identified from perceived stress on depressive
symptoms. However, strong significant associations between these variables were found in the within-time associations at T1 and T2. Furthermore, the cross-sectional associations between depressive symptoms and all socio-environmental factors (i.e., school belonging, SSR, and TSR) were found to be negatively significant. Overall, this is in line with results postulating a dynamic and mutual relationship of emotional instability and socio-environmental factors (Maurizi et al., 2013; Wentzel & Muenks, 2016). However, and against the hypothesis I, no cross-lagged paths between depressive symptoms and socio-environmental aspects were found to be significant over time.

The current results support hypothesis II partly, such as perceived stress was found to be positively related with other aspect of emotional instability as well as negatively related with all socio-environmental aspects in school context, but only concurrently and not longitudinally. In other words, perceived stress is not associated with any of the other variables over time. This contradicts current research postulating that the relationship between perceived stress and depressive symptoms is bidirectional (Hankin & Abramson, 2001). A possible explanation might be the long period of time between T1 and T2 in the current study (1.5 years), as no chronical stress could have been measured. Future studies might follow a research design with more measurement points within one school year, which allows the identification of chronical vs. acute stress.

Hypothesis III could only be partly confirmed. Concurrently, loneliness was positively related to the other aspects of emotional instability as well as negatively related to all three socio-environmental aspects in school context. As the cross-lagged association between students’ loneliness in early adolescence and students’ school belonging in middle adolescence was found to be negatively, this finding supports results showing school belonging to be associated with reduced feelings of loneliness (see Maurizi et al., 2013; Pittman & Richmond, 2007). Particularly, the results highlight the unidirectional nature of
this association, such that loneliness negatively predicts school belonging but not vice versa. Furthermore, as loneliness in early adolescence was positively associated with TSR in middle adolescence, it can be interpreted that students with poor or lacking relationships with peers in early adolescence, might turn to relationships with adults (other than parents) over time to gain support.

The current results support hypothesis IV partly. Concurrently, belonging was found to be positively related to all other socio-environmental aspects in school context, as well as negatively related to all aspects of emotional instability. In turn, the cross-lagged association between students’ school belonging in early adolescence and their level of perceived stress in middle adolescence was positive, which might be surprising as this association was found to be negatively related in the within-time associations. A possible explanation for this phenomenon might be that with a higher sense of belonging students’ involvement in school might increase as they are more likely to participate in more activities and therefore spend more time in school, as well as attribute more meaning to the relationships and experiences formed within it, which in turn increases the level of perceived stress over time. Furthermore, a cross-lagged path between belonging and TSR was found to be positively significant, which was also found to be significant in the other direction (from TSR to belonging) supporting hypothesis V partly.

TSR was also positively related to all other socio-environmental aspects in school context, as well as negatively related to all aspects of emotional instability within time. Furthermore, as mentioned-above, a cross-lagged path between TSR and belonging was found to be significant. This finding is in line with research highlighting that teacher’s support and their involvement in class-contexts are positively associated with adolescents’ feeling of belonging (see Maurizi et al., 2013), as well as with research, which found that a positive TSR is associated with a higher level of school belonging (Uslu & Gizir, 2017).
Finally, hypothesis VI could also be supported partly, as no significant cross-lagged paths could have been found over time. However, SSR was positively related to all other socio-environmental aspects in school context at T1, as well as negatively related to all aspects of emotional instability at T1 and T2. At T2, the relationship between TSR and SSR was no longer significant. This might be due to the fact that during adolescence students tend to closer distinguish between relationships with peers and teachers (Engels et al., 2016).

Overall, although not all cross-lagged-effects from early to middle adolescence were found to be significant, all variables (except SSR and TSR during T2) were significantly associated within time (both at T1 and T2). In sum, only three of the six identified cross-lagged effects operated between variables of emotional instability and socio-environmental school factors (i.e., school belonging was associated with perceived stress; loneliness with school belonging and TSR) supporting Bronfenbrenner’s socio-ecological model (Bronfenbrenner, 1975, 1979, 1989; Bronfenbrenner & Ceci, 1994), whereas the other three cross-lagged effects were identified between different variables of emotional instability (depressive symptoms was found to be associated perceived stress) or between variables of socio-environmental school factors (school belonging was associated with TSR and vice versa). The results suggest that prevention and intervention strategies should be implemented very early in students’ lives (e.g., late childhood) to protect adolescents from developing alarming indicators of chronical emotional instability (i.e., depressive symptoms, perceived stress, loneliness).

4.7 Practical Implications

There are different options on different levels for intervening or maintaining students’ emotional stability: Interventions on socio-environmental level (i.e., school environment) and interventions on individual level (Olsson et al., 2003). First, interventions focusing on students’ immediate socio-environment can foster students’ emotional stability by establishing a safe environment, acting against adversity actively and by creating a school
environment defined by supportive peer experiences, positive teacher influences and opportunities for (academic) success (Olsson et al., 2003). Second, interventions on students’ individual level might focus on emotional functioning deficits (e.g., by emotional-functioning-couching) in elementary school to foster a positive development and reduce negative socio-emotional and behavioral outcomes (i.e., emotional instability) like MDD, depressive symptoms, deviant behavior, aggression or perceived stress after experiencing peer-related stress (Agoston & Rudolph, 2016). Another possibility on individual level is to target shy people and their potential feelings of loneliness, as this might be a more evident and effective target than social relationships (Woodhouse, Dykas, & Cassidy, 2012).

But as social relationships play an important role in adolescence (Raufelder, 2007), interventions giving attention to social relationships may be more attractive (Maurizi et al., 2013). In addition, increasing cohesiveness and decreasing conflict in class contexts (i.e., focusing on child and teacher relationships and positive classroom climate), may influence students’ socio-emotional development and foster positive adaption and emotional stability (Baker, Grant, & Morlock, 2008). Moreover, intervention and/or prevention strategies should focus on fostering students’ awareness of their own personal conduct and healthy coping skills and resources as well as situations and interactions in the classroom in general (Olsson et al., 2003). Regarding intervention programs focusing on emotional instability, externally-sourced programs were found to be more effective than those delivered by school staff (Werner-Seidler, et al., 2017). Nevertheless, aside from all these options for intervening and/or preventing students’ emotional instability, teachers should still be aware of students’ inter-and intra-individual differences and the group dynamics that operate within their classroom (Engels et al., 2016), as well as their own potential to support students’ sense of school belonging and well-being.
4.8 Strength, Limitations and Future Directions

Based on data from a large sample of German secondary school students, the present study explored as one of the first within and over-time as well as cross-lagged-associations between aspects of emotional instability (i.e., depressive symptoms, perceived stress, and loneliness) and socio-environmental aspects of school (i.e., school belonging, TSR and SSR) from early to middle adolescence according to Bronfenbrenner’s socio-ecological model (Bronfenbrenner, 1975, 1979, 1989; Bronfenbrenner & Ceci, 1994). However, when interpreting the results of this study, some limitations should be considered: First, research found that loneliness is associated with peer rejection and lonely students are generally not liked by peers (Qualter et al., 2013). This study did not question why or when students felt lonely. In line with this, perceived loneliness might occur due to perceived social isolation or objective social isolation (i.e., students have no desire/necessity to build peer relationships) or passively (i.e., students perceive loneliness due to peer-rejection). Moreover, there is an overlap between loneliness and depressive symptoms, as loneliness might in itself be an indicator of depressive symptoms. Future studies are necessary to refine these aspects of loneliness and their associations with traits of emotional instability and socio-environmental aspects of classroom context. However, the associations of these two constructs do not indicate a statistical overlap.

Second it has to be mentioned that current studies have shown some weakness regarding the method used in this study. Hamaker, Kuiper and Grasman (2015) for example have shown that autoregressive associations are not measured adequately if the construct-stability is “trait-like” or time-invariant. This might lead to inadequate conclusions about existing causal associations, their strength or their sign. Therefore, future studies, which include an appropriate quantity of measurement points (more than two), should use alternative methods like the random intercepts cross-lagged panel Model (RI-CLPM; Hamaker, Kuiper &
Grasman, 2015) or the autoregressive latent trajectory Model with structured residuals (ALT-SR; Berry & Willoughby, 2016).

Third, the measure of TSR and SSR are more general in nature. Instruments that include more detailed questions about the hours spent with peers and teachers (also outside the school context), the quality of TSR and SSR and the reasons why those social relationships are defined as good and/or bad, would have offered a better insight into the associations studied. Future studies are warranted that focus more strongly on the quality of these relationships. In addition, a refinement of depressive symptoms (e.g., internal and behavioral aspects of depressive symptoms) and perceived stress (e.g., social, scholastic, parental stress) are necessary to gain a more profound insight into the origins and associations between these two constructs.

One may criticize the use of the self-report-data in this study (as no medical diagnosis of depressive symptoms could be generated). However, self-report data were appropriate for the current study as: (a) students’ perception of socio-environmental aspects in school (i.e., school belonging, TSR, SSR) were in focus, and (b) internal states (i.e., depressive symptoms, perceived stress and loneliness) were explored. Nevertheless, future studies might consider mixed-method-designs (i.e., quantitative and qualitative design) and/or case-vignettes to get more detailed results.

In sum, the results of this study have some important implications for prevention and interventions strategies, as outlined earlier. Moreover, this study sheds a brighter light onto important within- and over-time associations between students’ emotional instability (i.e., depressive symptoms, perceived stress, loneliness) and socio-environmental aspects (i.e., school belonging, TSR and SSR) in the transition from early to middle adolescence.
4.9 References


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5 Chapter 5—General Conclusions

The main objective of my dissertation is to examine the precise interplay between perceived stress and socio-emotional and behavioural strengths and difficulties from early to middle adolescence and to identify potential starting points that support students’ healthy development and foster children’s talents and academic careers. Specifically, my dissertation seeks to answer the following questions: Is the effect of perceived stress on socio-emotional and behavioural strengths and difficulties mediated or moderated by environmental factors (i.e., helpfulness and competition in class) during adolescence? Is there an interaction (moderation) between depressive symptoms and perceived stress—and which of both effects has a more significant impact on the development of socio-emotional and behavioural strengths and difficulties? Is the association between socio-environmental factors in school and emotional instability (i.e., perceived stress, depressive symptoms and loneliness) unidirectional or bidirectional over time?

5.1 Main findings

Study I sought to shed light on whether the association between perceived stress on socio-emotional and behavioural strengths and difficulties is mediated or moderated by environmental factors (i.e., helpfulness and competition in class) during adolescence. To test this potential interplay, I hypothesized that helpfulness and competition in class moderate (Ia) or mediate (Ib) the association between perceived stress and socio-emotional and behavioural strengths and difficulties from early to middle adolescence. Moreover, I hypothesized that (II) gender and age differences apply, such as that girls tend to report more emotional problems and prosocial behaviour, while boys show more problems with peers, conduct problems and symptoms of hyperactivity, and older male students report more socio-behavioural difficulties than younger ones. First, I used latent moderated structural equations (LMS) to test the
potential moderation effect and structural equation modeling (SEM) to test the potential mediation effect of helpfulness and competition in the association between perceived stress in early and socio-emotional and behavioural strengths and difficulties in middle adolescence. Second, I included gender and age as control variables.

In general, the findings of the LMS indicate that competition and helpfulness in early adolescence do not moderate the association between perceived stress and socio-emotional strengths and difficulties. This conclusion does not support hypothesis Ia. Hence, hypothesis Ib is only partly confirmed, as helpfulness in a class context only operates as a full mediator in the association between perceived stress and prosocial behaviour; it acts as a partial mediator in the association between perceived stress and problems with peers. Moreover, competition in the class context only partially mediates the association between perceived stress and problem with peers. As only three out of 10 indirect effects are significant, helpfulness and competition in early adolescence are only weak mediators in the association between perceived stress and socio-emotional and behavioural strengths and difficulties. In contrast, four out of five direct effects are found to be significant, which highlights the impact of perceived stress in early adolescence on the development of socio-emotional and behavioural strengths and difficulties in middle adolescence.

Hypothesis II is partly confirmed: Being a girl is significantly associated with more emotional problems and prosocial behaviour in middle adolescence, whereas being a boy is significantly associated with problems with peers and conduct problems in middle adolescence. Furthermore, age is only weakly associated with conduct problems: Older students exhibit more conduct problems.

Overall, my first study does not support the assumption that neither helpfulness in class can be seen as a coping resource during secondary appraisal, nor that competition in class can be seen as a stress intensifier. Beyond that, my study indicates that perceived stress
in early adolescence is positively associated with socio-emotional and behavioural difficulties (i.e., emotional problems, symptoms of hyperactivity, problems with peers and conduct problems) in middle adolescence, a finding which supports existing research (see Corominas-Roso et al., 2015; Hammen et al., 2011; Raposa et al., 2016). It can be concluded that the external aspects of helpfulness and competition in class are not strong enough to mitigate the internal interplay between perceived stress and socio-emotional and behavioural difficulties during adolescence. This might be because helpfulness and competition in class are mainly academic aspects. Future studies could examine more interpersonal aspects, such as peer relationships and friendships, as potential mediators and moderators.

In Study II, I sought to shed light on whether or not there is an interaction (moderation) between depressive symptoms and perceived stress—and identify which effect has a greater impact on the development of socio-emotional and behavioural strengths and difficulties. I considered the postulated bidirectional relationship between perceived stress and depressive symptoms (Hankin & Abramson, 2001), as both are associated with the onset of socio-emotional and behavioural difficulties and share certain comorbidity (see Mainzer, Pettit, & Viswesvaran, 2014; see Riglin et al., 2016).

In order to test perceived stress as a potential moderator, I used LMS. Overall, the main hypothesis is partly confirmed, as three interaction effects were identified: Perceived stress functions as a moderator in the association between depressive symptoms and conduct problems, symptoms of hyperactivity and prosocial behaviour. Additionally, my findings indicate that with a certain level of high perceived stress in early adolescence, the effect of depressive symptoms becomes almost irrelevant as related to students’ conduct problems. This is also true for the association between depressive symptoms in early and prosocial behaviour in middle adolescence. The same effect exists for the association between depressive symptoms and symptoms of hyperactivity: Even with high levels of depressive
symptoms students show less symptoms of hyperactivity than students with high levels of perceived stress. The results of my second study supports the assumption that the relationship between depressive symptoms and perceived stress is transactional and bidirectional (Hankin & Abramson, 2001). Moreover, findings indicate that perceived stress dominates the interaction when perceived strongly.

The objective of my third study was to examine whether the association between socio-environmental factors in school and emotional instability (i.e., perceived stress, depressive symptoms and loneliness) is unidirectional or bidirectional over time. Based on Bronfenbrenner’s bio-socio-ecological model (Bronfenbrenner, 1975, 1979, 1989; Bronfenbrenner & Ceci, 1994), school can be seen as one of the most important microsystems for students, and can have either positive or negative effects on adolescents’ socio-emotional and psychological development (Hanish et al., 2016; Pittman & Richmond, 2007). I examined the precise interplay between emotional instability (i.e., depressive symptoms, perceived stress and loneliness) and socio-environmental aspects in schools (i.e., sense of belonging, student-student and teacher–student relationships) by using a latent cross-lagged SEM. I hypothesized that the aspects of emotional instability (i.e., depressive symptoms, perceived stress and loneliness) in early adolescence are positively, concurrently and longitudinally associated and negatively associated with socio-environmental aspects of school (sense of belonging, student-student and teacher-student relationships) in middle adolescence. Also, I hypothesized that the socio-environmental aspects of school in early adolescence are positively, concurrently and longitudinally associated and negatively associated with aspects of emotional instability in middle adolescence. Results of the latent cross-lagged SEM partly supports my hypotheses: Although the within-time associations between aspects of emotional instability and socio-environmental aspects are significant in early adolescence (Time 1) and middle adolescence (Time 2) (except student-student and teacher-student relationship during
T2), I could only identify six cross-lagged associations – whereby only three cross-lagged effects are between aspects of emotional instability in early and socio-environmental aspects of school in middle adolescence (i.e., school belonging was associated with perceived stress; loneliness was associated with school belonging and teacher-student relationship). The results of my third study support the hypothesis that variables of emotional instability and socio-environmental factors are associated within time and stable over time, highlighting that prevention and intervention studies need to focus on these within-time associations and the stability of these variables from early to middle adolescence. Put simply, in order to foster students’ emotional stability, it is important not only to improve coping skills or minimize symptoms of emotional instability, but also to be aware of the impact of socio-environmental aspects on adolescents’ emotional instability.

5.2 Practical and theoretical implications

5.2.1 Practical implications for school context

Based on the questions posed and results of my Ph.D. study, I sought to identify starting points to support students’ healthy development and to foster children’s talents and academic careers. In my first study (Chapter 2), I demonstrate that neither helpfulness nor competition act as powerful moderators or mediators, which means that perceived stress has a greater impact on the development of socio-emotional and behavioural strengths and difficulties, and external stimulations have no significant effect in the association. In my second study (Chapter 3), I demonstrate that stress outweighs the interaction with depressive symptoms if perceived strongly. Furthermore, in my third study (Chapter 4) I demonstrate that perceived stress is stable from early to middle adolescence and shares within-time associations and comorbidities with other factors of emotional instability and socio-environmental factors. In order to guarantee students’ healthy development, the results of the
present studies indicate that it is necessary to implement prevention or intervention in schools targeting stress-reduction as early as possible, while focusing on and considering effects on the environmental (i.e., schools) and the individual (i.e., socio-emotional and behavioural factors) levels.

On the socio-environmental level, it is necessary to create a safe environment characterized by supportive social relationships (i.e., between peers and teachers) and opportunities for academic success (see Olsson et al., 2003). Moreover, it is necessary that students and teachers work actively against adversity within their social environment to decrease conflict in the class context (e.g., cyber-mobbing, exclusion and aggression). Such actions will have positive effects on the classroom climate and the quality of social relationships within the classroom. Since there are bidirectional relationships and comorbidities between environmental and socio-emotional and behavioural factors, it is necessary for teachers to be aware of and sensitive towards interindividual and intraindividual differences (i.e., heterogeneity and special needs) and group-dynamics within the classroom (see De Laet, 2016; Engels et al., 2016). On the environmental level, it might be important to shift the focus more towards students’ competences (i.e., competency grids) rather than grades in order to minimize competition and perceived stress within the class context. On the individual level, it is necessary to focus on adolescents’ socio-emotional functioning deficits (e.g., symptoms of hyperactivity, depression and loneliness) and to foster students’ awareness and mindfulness of cognitive processes and coping behaviour. Additionally, attention should be given to resources (i.e., stress-appraisal) and personal socio-emotional factors (Olsson et al., 2003). Examples of programs which do so include mindfulness intervention programs, such as mindfulness-based-stress reduction (MBSR), which represent useful strategies for developing cognitive and emotion regulation skills associated with later successful coping of stress (for further information see Brantley, 2005; Johnstone et al., 2016). Moreover,
mindfulness-based interventions are also associated with increasing attention (i.e., minimizing symptoms of ADHD), mood and self-management skills, while reducing the level of perceived stress (see Johnstone et al., 2016). Beyond the positive effects of MBSR, social- and emotional learning programs (SEL) (described by the Collaborative for Academic, Social, and Emotional Learning (CASEL)), focus on adolescents’ academic performance and healthy development (i.e., their awareness, self-management, social-awareness, responsible decision-making skills and improving adolescents’ attitudes and beliefs about their self, others and school). According to research, these programs are important and demonstrate that enhancing social emotional skills is associated with improved academic achievement (Corcoran, Cheung, Kim, & Xie, 2017; Durlak et al., 2011), and indicating that SEL have positive effects on reading and mathematics skills (Corcoran et al., 2017).

Yoga, a mind-body practice, combines both levels (i.e., environmental and individual) and improves mental, physical, and psychological health and well-being and fosters students’ awareness, mindfulness and cognitive functioning (see Ferreira-Vorkapic et al., 2015; see Khalsa, Hickey-Schultz, Cohen, Steiner, & Cope, 2012). The ashtanga yoga practice includes physical exercises and body postures (Asana), breathing techniques and breath control (Pranayama), sensory withdrawal (Pratyahara), concentration and focus of the mind (Dharana) and meditation (Dhyana). Yoga requires body awareness and attention, generates relaxation effects and is associated with improvements in self-control, concentration, mood, self-efficacy and attention (i.e., decrease of symptoms of ADHD) (see Ferreira-Vorkapic et al., 2015; see Khalsa et al., 2012). Practicing yoga has been found to improve emotional self-

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4 For further stress-prevention and intervention programs see Raufelder and Hoferichter, 2017.

5 For further information on Ashtanga Yoga, the eight limbs and its philosophy, see: Pattabhi Jois S.K. (2010) or Maehle, G. (2007).
regulation and to reduce depression and depressive symptoms as well as perceived stress in children, adolescents and adults (see Ferreira-Vorkapic et al., 2015; see Khalsa et al., 2012).

5.2.2 Theoretical implications

Aside from the above-mentioned prevention and intervention strategies affecting the environmental and individual levels, my dissertation also reveals some theoretical implications: My first study (Chapter 2) was based on the transactional stress model by Lazarus and Folkman (1984). I tested whether helpfulness and competition in a class context are resources or threats (i.e., mediators or moderators) during the cognitive process of secondary appraisal and the association between perceived stress in early and socio-emotional and behavioural strengths and difficulties in middle adolescence. Results indicate that helpfulness and competition in a class context are neither resources nor threats during secondary appraisal. This highlights the importance of obtaining a deeper empirical insight into environmental and individual resources (i.e., within and out of class context) to identify further potential intervention or prevention programs for adolescents. Additionally, the transactional stress model of Lazarus and Folkman (1984) primarily focus on daily hassles to explain perceived stress. To achieve the above-mentioned deeper empirical insight on resources, it is also necessary to further specify and distinguish potential origins of stress (i.e., family context, school context and problems with peers or teachers), which are neglected in the transactional stress model. Nevertheless, the transactional stress model can be used as a practical instrument in a school context on the individual level: As the cognitive processes

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6 Over time the intervention group, which practiced yoga, was more likely to report higher levels of perceived stress and a greater frequency of coping with stress. This might be a result of becoming aware of different emotions and becoming more mindful (see Ferreira-Vorkapic et al., 2015). In addition, it must be noted that students who practiced yoga reported higher stress-levels, but were also better able to cope successfully with stress.
(i.e., appraisals) are rather unconscious and parallel, it is necessary to disclose them to students in order to enhance their awareness of various daily hassles and situations.

My second study (Chapter 3) was based on the revised generic cognitive vulnerability-stress model by Hankin and Abramson (2001), and I focused on the aspect of developmental sensitivity (i.e., the developmental and vulnerable time during adolescence in which socio-emotional and behavioural strengths and difficulties might be affected by internal [e.g., depressive symptoms] or external factors [e.g., perceived pressure or stress]). My results align with the theory’s assumptions, as the relationship between depressive symptoms and perceived stress was bidirectional and not unidirectional. Extending the theory, I demonstrate that stress dominates this interaction when perceived to be high in magnitude. What remains unclear is the role of cognitive vulnerability during adolescence and its effect on the development of depressive symptoms, perceived stress and socio-emotional strengths and difficulties. One could ask whether this cognitive vulnerability is biological (i.e., a cognitive change due to puberty and hormones) or genetic and whether this cognitive vulnerability is the cause or origin of perceived stress during adolescence. This needs to be examined in more detail with new research yielding data based on larger and longitudinal studies. In order to examine cognitive vulnerability’s precise origin, its stability and its effect on the development of socio-emotional and behavioural difficulties during an individual’s life-span (e.g., early childhood to late adulthood), it is further necessary to develop interdisciplinary research projects that include and test various biological, medical, sociological, education and psychological theoretical assumptions.

Finally, my third study (Chapter 4) was based on Bronfenbrenner’s bio-socio-ecological model (Bronfenbrenner, 1975, 1979, 1989; Bronfenbrenner & Ceci, 1994; Bronfenbrenner & Morris, 1998). My results support a bidirectional association between aspects of emotional instability and socio-environmental aspects within the measurement
points and within the school microsystem, supporting the assumption of the bio-socio-ecological model. What remains unclear is the precise interplay between and the origins of emotional instabilities and socio-environmental factors: Do they occur within various microsystems (e.g., family) and does the individual’s stress perception vary between different microsystems? Is there a difference between and within classrooms and individuals? How do the microsystems interact, and which has a greater impact on the development of psycho-physiological and social difficulties? Answering these questions to elaborate and test the theories requires further empirical studies.

Another important question is whether it is possible and beneficial to integrate the theoretical assumptions of the transactional model of stress and coping by Lazarus and Folkman (1984), the cognitive vulnerability-transactional stress theory by Hankin and Abramson (2001) and Bronfenbrenner’s bio-socio-ecological model (Bronfenbrenner, 1975, 1979, 1989). All three theories state that the individual interacts with his or her immediate environment, while this environment is only further defined within the bio-socio-ecological model. The individual lives within various microsystems (e.g., school, family, sport club) that create the individuals’ mesosystem (Bronfenbrenner & Morris, 1998). As a result, as the individual interacts with these microsystems (Bronfenbrenner, 1975, 1979, 1989), he or she is confronted with various daily hassles and independent and dependent life events (Hankin & Abramson, 2001), which are then cognitively appraised (Lazarus & Folkman, 1984). The effectiveness of the appraisals depends on the individual’s cognitive ability (vulnerability) (Hankin & Abramson, 2001). These transactional influences on the individual within various microsystems have an impact on the development of socio-emotional and behavioural strengths and difficulties. In sum, it is important and beneficial to integrate these theoretical assumptions to get a holistic view of the unconscious influences of various microsystems on
the individual’s stress perception, stress appraisal, stress origin, cognitive vulnerability and their consequences during life span.

5.3 Future directions

Future longitudinal empirical studies with multiple measurement points are necessary to reach deeper insights into the precise interplay between perceived stress and socio-emotional and behavioural strengths and difficulties identifying intraindividual and interindividual differences in different time frames (e.g., six months, a year, 1.5 years) during adolescence.

Such studies could examine perceived stress as a potential mediator in the association between socio-emotional and behavioural strengths and difficulties, emotional instability and other important developmental and academic factors, including intrinsic motivation, self-concept, anxieties or cognitive and socio-psychological development. Moreover, future studies might examine cross-cultural and demographic differences in stress perception with the inclusion of various age and ethnic groups. Also, future studies should examine gender and age differences in more detail, as studies have indicated gender and age differences in stress perception (see Moksnes et al., 2016), the development, comorbidities and stability of socio-emotional and behavioural strengths and difficulties (see Faulstich-Wieland, 2008; Seiffge-Krenke, 2006; see Silk, Steinberg & Morris, 2003, Stringaris, Lewis & Maughan, 2014; see Rendtorff, 2014) as well as cognitive vulnerability (see Braet et al., 2013; see Hankin & Abramson, 2001). Hankin and Abramson (2001) found a dramatic overall increase of depression rates during adolescence, with girls showing a more dramatic increase than boys beginning in middle adolescence after the age of 13. Moksnes, Bradley-Eilsersten and Lazarewicz (2016) have shown that stress from school performance and school attendance was associated with depressive symptoms for both genders, although girls scored higher on depressive symptoms and all stress domains.
In addition, future studies that take age into consideration when examining stress and socio-emotional and behavioural strengths and difficulties should use more measurement points between early childhood to late adulthood. This longitudinal and cross-cultural design might help to secure a detailed view on the origins and interindividual or intraindividual differences of stress perception and the onset of socio-emotional strengths and difficulties. Further, multilevel-modeling in future studies might help to achieve a broader perspective of intra- and interindividual differences of stress perception and a better understanding of stress differences and their dependency on the stress perceptions of classmates (e.g., perceived stress within and between classes or individuals or perceived stress between and within different school-tracks).

Other study designs might broaden my findings: Along with using additional measurement points, age groups and cross-cultural samples, it might be helpful to include vignettes\(^7\) and mixed-method-approaches (i.e., quantitative and qualitative) to investigate perceived stress and socio-emotional and behavioural strengths and difficulties in more detail. Interdisciplinary studies and research projects are essential, as well, to expand my findings and the theories used in my studies. Additional research projects might integrate relevant neurobiological and psychological findings to investigate the role of cognitive vulnerability, telomere shortening,\(^8\) perceived stress and socio-emotional strengths and difficulties throughout life.

Hence, future studies have to refine the definition (e.g., daily hassles vs. special or traumatic stressful life events) and origins of stress to shed light on the sources (i.e., Microsystems; internal or external) of stress, the onset and instabilities of socio-emotional strengths and difficulties, and the effect of stress on students’ healthy development. Such

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\(^7\) For further information see: Baur and Blasius (2014).

\(^8\) For further information on the association between telomere shortening and perceived stress, see Mathur et al. (2016).
future studies might further refine socio-emotional and behavioural difficulties (e.g., symptoms of depression and hyperactivity, stress, loneliness, problems with peers or teachers and conduct problems) and strengths (i.e., prosocial behaviour, belonging and social relationships) and their associations and comorbidity during adolescence in order to get a detailed view of potential bidirectionalities.

In sum, my dissertation builds on and extends existing studies and research on perceived stress and socio-emotional and behavioural strengths and difficulties during the transition from early to middle adolescence by investigating this interplay within the school microsystem and the effects of environmental factors. The findings provide clear importance of effective prevention and intervention programs in order to foster students’ socio-emotional and behavioural stability and strengths starting at an early point of time.
5.4 References


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स्वस्ति प्रजाभ्यः परिपालयन्तां न्यायेन मार्गेण महीं महीशाः ।
गोब्राह्मणेभ्यः शुभमस्तु नित्यं लोकः समस्ता: सुखिनो भवन्तु ॥
ॐ शान्ति: शान्ति: शान्ति: ॥

Om
svastiprajābhyaḥ paripālayantāṁ nyāyena mārgena mahīṁ mahīśāḥ |
 gobrāhmanebhyaḥ śubhamastu nityam lokāḥ samastāḥ sukho bhavantu ॥
Om śāntiḥ śāntiḥ śāntiḥ ॥

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ॐ Om
may the leaders of the earth protect and guide us on the virtuous path
may this generation and all generations to come be blessed with auspiciousness
may all animals and knowers of divinity be blessed with eternal prosperity
may all beings in all worlds be happy
om peace peace peace
(retrieved from: http://larugayoga.com/practice/invocation/)