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An investigation and extension of a typology of socio-motivational (in-)dependency

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Abstract

School is a place where students spend a significant portion of their time during childhood and adolescence. There, they experience academic achievement, but it is also a place of socio-emotional development. This socio-emotional development is affected through social, instructional, and organizational processes (Eccles & Roeser, 2009). Recent research has identified that teachers and peers play a divergent roll in student motivation. For some students, teachers are a crucial resource for her or his academic motivation, whereas for other students it is their peers who affect the motivation. There are also students whose motivation is influenced by both, teachers and peers. However, there is a fourth group that appears to be unaffected by teachers and peers in their motivation.

The aim of this dissertation is to further enhance our understanding of socio-motivational (in-)dependency during early and middle adolescence. It will extend our knowledge of interindividual differences and intraindividual changes in the effect of teacher-student and student-student relationships on adolescents' academic motivation. In the first article, I examined students' academic motivation, academic achievement, and social relationships at school and their link to students' perceptions of teachers and peers as a potential source of motivation. The goal in examining this link, was to expand the understanding of the typology and to highlight characteristics of the various types. The question was, to what extent does students' motivation, academic achievement, and social relationships influence the differential perception of peers and teachers as motivators? To answer this question, the latent class model from a preliminary study (Raufelder, Jagenow, Drury, & Hoferichter, 2013) was extended by a multinomial logistic regression model to one conjoint model. The new model was used to examine whether the LCs were explained by various covariates using a three-step approach. However, to my knowledge,

this type of model has not been used in an educational psychological research context before. By including explanatory variables to predict different expressions of socio-motivational (in-) dependency, I aimed to demonstrate that academic achievement, motivation, and relationships with different significant others can predict the belonging to each type.

This first article of my dissertation sheds light on the differences between the four distinguished types of socio-motivational (in-)dependency. Intrinsic motivation, achievement drive, learning goals and academic achievement are predictors of differences in students' perception of teachers and peers as a potential source of motivation. In contrast, the quality of social relationships with peers is no significant predictor of socio-motivational (in-)dependency. The findings give a more comprehensive picture on the existing differences between the four motivation types.

In the second article, I investigated interindividual differences and intraindividual changes over time in adolescent students' socio-motivational (in-)dependency. Therefore, I tested whether the four types of socio-motivational (in-)dependency found in seventh and eighth graders can be identified within the same cohort approximately two years later. Moreover, I tested to what extent individuals vary in their socio-motivational (in-)dependency from early to middle adolescence. As a first step, latent class analyses were used to investigate interindividual differences in adolescents' socio-motivational (in-)dependency in ninth and tenth graders. As a second step, latent transition analyses were employed to investigate intraindividual changes in students' socio-motivational (in-)dependency from seventh and eighth grade to ninth and tenth grade. The analyses indicated the presence of important interindividual differences in students' socio-motivational (in-)dependency through adolescence. In addition, the composition of the

sample constituting each type changed over time indicating intraindividual changes over time in adolescent students' perceptions of teachers and peers as potential sources of motivation.

This second article complements the existing findings by further enriching our understanding of intra- and interindividual changes in adolescents' socio-motivational (in-) dependency. The article provides important novel findings regarding students' sources of motivation across adolescence and underlines the validity of the typology.

The third article aimed to extend previous findings by examining students' perceptions considering negative effects from teachers and peers on academic motivation. I investigated positive and negative effects of teachers and peers, following a longitudinal research design to consider intraindividual differences and interindividual changes in students' socio-motivational (in-)dependency across early to middle adolescence. As in the second article, latent class and latent transition analyses were employed. Six different motivation types could be distinguished in seventh and eighth grade students within the same cohort approximately two years later. Teachers function not only as positive motivator but also as negative. However, students did not perceive peers as having negative effects on their own motivation. Concerning changes over time, the composition of the sample, constituting each type, changed over time, indicating intraindividual changes in students' perceptions of teachers and peers as potential sources of motivation. The findings from the third article revealed additional differences in students' perceptions of teachers as potential negative motivators, thus further advancing our understanding of academic motivation.

The results of this dissertation raise important implications not only for research on socio-motivational (in-)dependency but also for research on social environment and its link to school adjustment. The research provides practical implications for the learning and teaching

tools used on a daily basis in schools, as well as a novel theoretical perspective into the interplay between social relationships and motivation in classroom environments. The new insights into the role of peers and teachers on students' motivation will be discussed.

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Chapter 1: **Introduction**

1.1   Dissertation Goals and Contributions

Education is, in many respects, a social interaction. For example, instructions require that teachers and students communicate, which sounds trivial but is a complex social process. The study of social relationships at school represents a vital link in the efforts to understand individual differences in school engagement. This call for research on the process of social environment is complicated by two key factors. First, the extant literature indicates that social relationships are a complex phenomenon involving influences at several levels of functioning. A large array of variables within the students and in his or her relationships with others, inside and outside the school, are predictive of academic motivation. Second, in parallel with the lack of a single agreed-upon definition of academic motivation, there is no specific theory as to how all these forces interact to influence the development of motivation. Instead, scholars have tended to use broad theories to provide some general framework for examining academic motivation. For example, research on students' relationships with teachers and peers are guided by principles of self-determination theory (Deci & Ryan, 2000b), attachment theory (Bretherton, 1987), and social support perspectives.

When investigating social environmental factors for students' school adjustment, teacher characteristics where predominantly of researchers' interest (e.g., Archambault, Pagani, & Fitzpatrick, 2013; Gehlbach, Brinkworth, & Harris, 2012; Hamre & Pianta, 2001; Roorda, Koomen, Spilt, & Oort, 2011; Wentzel, 2010). Beside teachers, peers are important social agents in students' daily lives. However, differences in students' individual perceptions of teachers and peers as a potential source of motivation seem to be neglected in this context. To meet this challenge, Raufelder, Jagenow, Drury, and Hoferichter (2013) suggest a typology to address the

exploration of socio-motivational (in-)dependency (see section 1.2.3) and the developmental course of this (in-)dependency. According to this typology, students differ whether the teacher and or the peers influence the motivation positively.

Classifying adolescents into groups can be useful for understanding individual differences in development (Magnusson & Cairns, 1996) and this classification is employed by student-relations researchers interested in subgroups of relatedness to teachers, parents and peers (e.g., Furrer & Skinner, 2003). In light of the interest in socio-motivational (in-)dependency, three central questions are addressed in this dissertation. (1) How is the typology, introduced by Raufelder, Jagenow, Drury, and colleagues (2013), related to students' academic and social functioning at school? More precisely, can academic motivation, academic achievement or the quality of social relationships at school predict individuals' perceptions of teachers and peers influencing ones' motivation? The link between social relationships and motivation is long studied (e.g. A. M. Ryan & Ladd, 2012; Wentzel & Wigfield, 2009) and the nature of social relationships that one creates and maintains at school can enhance or undermine students' academic motivation (Deci & Ryan, 2008; Reeve, 2006). (2) How stable are the students' perceptions of teachers and peers as sources of motivation during adolescence? Students' motivation declines after the transition to secondary school and continues to do so for the first three years of high school (Harter, 1996), reaching its nadir in the ninth grade (Eccles & Wigfield, 1998). In addition, the strength of the association between teachers' support and students' motivation decreases from sixth to eighth grade (Goodenow, 1993). Moreover, with the beginning of adolescence, individuals spend a large part of their time in school interacting with their peers; thus, peers might have an increasing impact on students' school engagement as compared to their teachers or parents (e.g., Brown, 1990; Csikszentmihalyi & Larson, 1984;

Hymel, Comfort, Schonert-Reichl, & McDougall, 1996; Levitt, 2005; Rohrbeck, 2003). (3) Do teachers and peers have not only positive effects on students' motivation but also negative? Furthermore, do students' individual perceptions of teachers and peers as having a potential negative effect on motivation change during adolescence? Problematic school behavior, such as not paying attention in class, is largely influenced by peers (Geven, Weesie, & van Tubergen, 2013). Furthermore, with the entry into secondary school, adolescents start to perceive their teachers as less supportive and caring than teachers in elementary school (Eccles et al., 1993; Harter, 1996; Hawkins, 1985). Negative teacher-student relationships, in which students perceive their teachers as uncaring or cold, are associated with less intrinsic motivation (R. M. Ryan & Deci, 2000a).

First, an overview of findings from research on teacher-student and student-student relationships and their impact on school adjustment will be presented. Subsequently, different perspectives on motivation will be described. To complete the first chapter, the concept of socio-motivational (in-)dependency and the typology that guides this work will be introduced. This is followed by the three articles on which this dissertation is based. Finally, a general discussion will be provided where the main findings of the three articles are summarized. Moreover, strengths and limitations of this dissertation are outlined, and further directions and general conclusions will be presented.

1.2 Literature review

In this dissertation, I focus on two general domains of the educational context that might be considered to influence students' academic motivation: teachers and peers. In the following sections, a theoretical framework guiding this dissertation will be presented. First, I will give a

brief review of the research on teacher-student as well as student-student relationships and their connection to school adjustment.

1.2.1 The Study of Social Relationships at School.

1.2.1.1 Teacher-student Relationship

One question often asked by educational researchers is why do some students put forth more engagement and effort in academic tasks for one teacher, but not for another (Montalvo, Mansfield, & Miller, 2007)? As a consequence, a teacher's characteristics (i.e., teaching style, support, sympathy) are of great interest while studying academic success. Meta-analyses provide evidence of the impact of teacher behavior on student outcomes. For example, Cornelius-White (2007) found association between teacher variables (i.e., warmth, empathy, encouraging learning) and student engagement (i.e., cognitive and behavioral). Another two meta-analyses revealed association between verbal and nonverbal directedness of teachers' communication and students' learning engagement (Allen, Witt, & Wheeless, 2006; Witt, Wheeless, & Allen, 2004).

Moreover, teachers might be more likely to provide extra support to students with whom they have a positive relationship (Hamre & Pianta, 2001; Resnick et al., 1997). Both longitudinal and cross-sectional studies have shown that the quality of teacher-student relationships predicts student engagement and social-emotional well-being in school (Deci & Ryan, 2002a; Hattie, 2009; Wentzel, 2009b). According to an extended attachment perspective, supportive teachers can serve as a secure base from which students can explore the school environment and become engaged in learning tasks (Birch & Ladd, 1997; Pianta, 1999). According to the self-determination theory, three basic psychological needs must be fulfilled for students to become motivated: needs for relatedness, for competence, and for autonomy (Deci & Ryan, 1985, 2000b). By providing structure (i.e., being consistent and setting clear rules), showing

involvement (i.e., expressing interest in and caring for students), and supporting autonomy (i.e., giving students freedom to make their own choices), the teacher can support these needs. As a result, students engagement in learning tasks will increase (Skinner & Belmont, 1993).

However, with students' transition from primary to secondary school in seventh grade, adolescents start to perceive their teachers as more distant and consequently less friendly, supportive, warm, and caring than teachers in elementary school (Eccles, et al., 1993; Harter, 1996; Hawkins, 1985). It has been observed that the quality of the teacher-student relationship decreases from the age of 12 to 18 (e.g., Bokhorst, Sumter, & Westenberg, 2010). As mentioned above, the relationships with teachers are essential as they determine students' academic success (e.g. Baker, 2006; Davidson, Gest, & Welsh, 2010; Hughes, 2012; Wentzel, Battle, Russell, & Looney, 2010; Zimmer-Gembeck, Chipuer, Hanisch, Creed, & McGregor, 2006). Negative teacher-student relationships, in which students perceive their teachers as uncaring or cold, are associated with less intrinsic motivation (R. M. Ryan & Deci, 2000a). In addition, from sixth to eighth grade, students perceive their teachers as more evaluative and controlling (Harter, 1996). Controlling teaching behaviors, such as offering a lack of choice in the classroom, assigning boring tasks, and providing low teacher support leads to students' disengagement and withdrawal, and consequently an undermining of motivation (Roeser & Eccles, 1998; Skinner & Belmont, 1993).

1.2.1.2 *Student-student Relationship*

With adolescence, peers become important social agents within the school context. There is a consensus within the literature, that friends have a strong influence on students' attitudes toward school, behavior in class and academic achievement (e.g. Berndt & Keefe, 1996; Bishop, 1989; Coleman, 1961; Wentzel, 2009a). Peer acceptance provides young adolescents with a

sense of connection and relatedness that promotes a sense of belonging (Goodenow, 1993) and empowers them to engage in class activities (Buhs & Ladd, 2001). Whereas teacher characteristics have been associated with students' interest in classroom activities and their overall academic goal motivation, peer relationships are associated with feelings of social adjustment in the classroom environment that, in turn, increases the motivation to cooperate with and help others. Positive emotional support from friends and other peers is associated with higher levels of school engagement (Shin, Daly, & Vera, 2007), vice versa, conflict with friends is associated with lower engagement (Ladd & Kochenderfer, 1996). When friends at school are a positive recourse (e.g., help to navigate the school process) the level of achievement of the friends seems to be more important than their attitudes toward school (Crosnoe, Cavanagh, & Elder, 2003). Crosnoe and colleagues suggest that behavioral models outbalance value exposure in academic settings and performance is more important than their feelings about school.

Friendships and peer acceptance at school might promote social inclusion in the classroom, which, in turn, may yield resources that foster academic achievement (Ladd, 2003). One explanation might be an observational learning process, whereby peers model behavior is adopted by others (Berndt, 1999; Hartup & Stevens, 1997). Following Bandura's social learning theory (1986), an observed behavior is likely to be imitated when it has some functional value (e.g., successful learning behavior). However, theoretical perspectives that account for the influence of peers on individuals' school-related outcomes have not been well developed (Wentzel, Barry, & Caldwell, 2004).

Research has shown that peer groups can promote but also undermine students' academic motivation (e.g., Kindermann, 1993). Results by Geven, Weesei, and van Tubergen (2013) indicate that problematic school behavior, such as not paying attention in class, is largely

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influenced by peers. Following the imitation hypothesis, peers function as models for achievement and school engagement (Ladd, 2007; Rohrbeck, 2003). Students imitate school related goals and behaviors which affect attitudes toward school and encourage respectively discourage their participation in school activities. However, with the entry in secondary school in seventh grade, adolescents must adjust to a new peer group and coordinate old and new friendships (Azmitia, Cooper, & Brown, 2009). Moreover, social withdrawal can have detrimental outcomes in school such as a decrease in achievement motivation, lower self-worth, and poor school performance in general (Buhs, Ladd, & Herald, 2006; Coie, Lochman, Terry, & Hyman, 1992; DeRosier, Kupersmidt, & Patterson, 1994; Ollendick, Weist, Borden, & Greene, 1992).

1.2.2   Academic Motivation.

In this dissertation, students' perceptions of teachers and peers as a potential source of motivation are investigated. Following the brief review of research on teacher-student, student-student relationships and its linkage to school adjustment, three different perspectives on academic motivation will be described.

1.2.2.1   Achievement Motivation

Achievement motivation describes individuals' tendency to compare one's actions with one's own quality standards and to strive to meet or exceed these standards in achievement situations (McClelland, Atkinson, Clark, & Lowell, 1953). Highly achievement motivated people typically try to master a difficult task, to act a little better and faster, to reach a high standard or to excel other in the competition. Two aspects of achievement motivation can be distinguished (Atkinson, 1957, 1958): (1) Success-motivation (hope of success) describes the capability to feel pride in the own performance and the tendency to seek challenges. (2) Failure-motivation (fear

of failure) is associated with feelings of shame about failure and the tendency to avoid failure.

People motivated by success are typically interested in assessing their abilities and, thus, tend to actively search for difficult tasks (Langens & Schüler, 2006) in order to obtain feedback. In contrast, individuals motivated by failure, tend to avoid achievement-related tasks, instead choosing either simple tasks, where success is guaranteed, or extremely difficult tasks, in which failure can be attributed externally (Rheinberg, 2000).

1.2.2.2   *Achievement Goal Orientation*

A goal is a cognitive representation of the purpose for doing a task and achievement goals represent patterns of beliefs about the purpose for achievement and the standards that will be used to evaluate the effective performance (Pintrich, 2000). Thus, achievement goal orientation refers to the representation of achievement goals as well as related persuasions about success, competence, purpose, effort, and ability. Two different categories can be distinguished within the achievement goal orientation (Dweck, 1986). Individuals with a strong learning-goal orientation aim to develop their skills and thus tend to invest overall more effort in tasks, effectively performing well in them. In contrast, performance-goal orientation is associated with benefits in some situations and costs in others (Elliot, Shell, Henry, & Maier, 2005). In contexts where performance is expected to be rewarded, this orientation will trigger better performance than learning-goal orientation. However, in contexts with no external incentives, performance of individuals exhibiting the performance-goal orientation will be below their potential. Importantly, two contrasting tendencies can be distinguished within the performance-goal orientation: a tendency to demonstrate capability to others versus a tendency to avoid demonstrating incapability to others (Elliot, 1999; Harackiewicz, Barron, & Elliot, 1998). Some

authors also distinguish the avoidance tendency (e.g. Nicholls, 1984), where achieving the goal, with as little effort as possible, is the only aim.

1.2.2.3 *Academic Self-Regulation*

The self-determination theory (SDT), developed by Deci and Ryan (1985, 2002b), differentiates between two types of motivation: Behavior of an *intrinsically* motivated person is driven by internal intentions, while an *extrinsically* motivated person is driven by forces originating in her environment. Deci and Ryan (2002b) distinguish three different forms of extrinsically regulated behavior that vary in the degree of self-determination: (1) external-regulation style, (2) introjected-regulation style, and (3) identified-regulation style. The external-regulation style, which corresponds to the traditional definition of extrinsic motivation, is motivated by contingencies associated with external rewards and punishments, e.g., learning to get a good grade. As such, it is characterized by low levels of perceived self-determination. The introjected-regulation style describes behavior typically motivated by contingencies related to self-esteem, e.g., learning to please others. Although external influences are now no longer required to trigger behavior, such individuals are considered to have a low level of self-determination because their behavior is still controlled by external expectations, which simply have been internalized. The identified-regulation style is associated with the highest levels of self-determination within the category of extrinsic motivations, as such individuals are motivated by identification with long-term goals, e.g., learning to obtain a diploma. This style, bearing many similarities to intrinsically motivated behavior, arises from identifying with the internalized values that have been harmoniously combined with other aspects of the self.

1.2.3   Socio-motivational (In-)Dependency.

A rather new approach to investigate the linkage of social relationships and motivation at school is studying students' socio-motivational (in-)dependency (Raufelder, Bukowski, & Mohr, 2013; Raufelder, Jagenow, Drury, et al., 2013). It describes the persuasibility of students' learning motivation by specific teacher or peer variables. Socio-motivational dependency is when one's personal motivation is affected by the motivation of others, their learning behavior, or the perceived support. For example, students' motivation can be predominately affected by social support, others learning behavior, or learning motivation (Raufelder, Drury, Jagenow, Hoferichter, & Bukowski, 2013; Wentzel, 2009a, 2009b). In contrast, socio-motivational independence exists when one's personal motivation is unaffected by social support, others learning behavior, or learning motivation. Qualitative interviews, ethnographic field notes, and participant observation have revealed that students differ in their experiences of teachers or peers as potential sources of motivation (Raufelder, 2007). Based on these findings, a survey was conducted to quantify those differences. In preparation and on the grounds of a lack of an adequate questionnaire, Raufelder, Drury and colleagues conducted the REMO Relationship and Motivation questionnaire (REMO) to capture interindividual differences in perceived influence of teachers and peers on students' academic motivation (Raufelder, Drury, et al., 2013). Data analysis subsequently performed on self-reports of socio-motivational (in-)dependency revealed four different motivation types (MT): (1) teacher-dependent MT, (2) peer-dependent MT, (3) teacher-and-peer-dependent MT, (4) teacher-and-peer-independent MT (Raufelder, Jagenow, Drury, et al., 2013). The teacher-dependent MT can be characterized as a student whose motivation to learn is positively influenced by the fondness of the teacher, the conviction of the teacher's interest in the subject, the teaching style, and the teacher's awareness of students'

abilities. In contrast to the teacher-dependent MT that is motivated independently of relationships with peers, the peer-dependent MT is motivated independently of the relationships with teachers. The latter type is motivated by the perception of peers' academic motivation, their learning progress and school engagement. The teacher-and-peer-dependent MT can be interpreted as a mixed type. Student's motivation of this type is influenced by both relationships with teachers and relationships with peers. In contrast to all those types described above, relationships with teachers and peers are of no or little importance for the teacher-and-peer-independent MT. Its motivation at school seems to be dependent on influences other than social relationships with peers and teachers.

The typology could be confirmed not only in a sample of German adolescent students (Raufelder, Jagenow, Drury, et al., 2013) but also in a sample of Canadian adolescent students (Hoferichter, Raufelder, Eid, & Bukowski, 2014). Further investigations of the typology revealed differences between the four types. For example, the teacher-and-peer-dependent MT show a higher learning rate in a probabilistic reversal learning task than the teacher-and-peer-independent MT (Raufelder et al., 2016). The authors suggest that the teacher-and-peer-dependent MT is more likely to immediately adjust their behavior according to the feedback they receive during the learning task than the independent type. Other results from Raufelder, Regner, Drury and Eid (2016) revealed that students of the teacher-and-peer-dependent MT demonstrate a higher level of school engagement than the other three types. Regarding the self-determination theory (Deci & Ryan, 1985), the four MTs differ in their perceived satisfaction in relation to the psychological needs for autonomy, relatedness and competence (Raufelder, Regner, et al., 2016). These needs are satisfied better in school for the peer-and-teacher-dependent MT than for the other three MTs.

Questions that are unanswered so far are: Do the types differ in academic motivation, academic achievement or social relationships at school? Do students' perception of teachers and peers as a potential source of motivation change with time? And, are teachers and peers perceived as negative motivators? In the following three chapters, articles that further investigate and extend the typology of socio-motivational (in-)dependency will be presented.

Chapter 2: **Article 1**

A person-oriented approach to predict socio-motivational dependency in early adolescents

2.1 Introduction

One of the most important psychological concepts underlying inter-individual differences that can be visible in the classroom environment is motivation. As the long tradition of motivation research has shown, academic motivation is related to various outcomes, such as curiosity, learning potential, perseverance, and academic performance (e.g., Deci & Ryan, 1985), which demonstrates its central role in the area of educational and school psychology. However, the majority of studies examining the impact of classroom environment on academic achievement and motivation focus on purely additive effects by using variable-oriented methods (see Davidson, Gest, & Welsh, 2010), while ignoring interactions between the variables (Raufelder, Jagenow, Hoferichter, & Drury, 2013; Rosato & Baer, 2012). It is important to consider the configuration of traits, abilities, and limitations that emerge from individuals' unique experiences during development. All the characteristics manifest jointly as individual differences in intelligence, creativity, cognitive style, motivation, as well as in the capacity to process information, communicate with, and relate to others (Woolflok, Winne, & Perry, 2006). As a consequence of widely ignored interactions in the variable-oriented statistical analyses combined with an apparent reluctance to employ person-oriented methods in the areas of educational and school psychology (Rosato & Baer, 2012), our knowledge on the role and the importance of inter-individual differences in students' motivation is limited.

In general, the variable-oriented approach is used for describing overall association between variables in a population. However, the approach has limitations when associations

among variables vary across different subgroups within a population (von Eye, Bogat, & Rhodes, 2006). For example, if different subgroups of students show different patterns of motivational orientation that are related to motivation in a unique way, then a population-level covariation between motivational orientation and measures of motivation could be misleading. In contrast, the person-oriented research focuses on homogeneous subgroups. Furrer and Skinner (2003) conducted one of the few person-oriented studies in the field of educational psychology to test for configuration effects and found that positive experiences in one relational context may buffer impacts of negative relational experiences in another context. Namely, children's self-reported higher relatedness (e.g., feelings of belonging, inclusion, acceptance, importance, interpersonal support) to teachers was associated with higher emotional and behavioral engagement in classroom environments despite the same children reporting low relatedness to peers and parents. Furthermore, a longitudinal study by Davidson, Gest, and Welsh (2010) demonstrated different long-term patterns of school adjustment for teacher relatedness, peer relatedness, and teacher- and peer-relatedness. Overall, these findings illustrate the potential advantage of the person-oriented approach over the variable-oriented approach. Therefore, the aim of the present study was to employ the person-oriented approach (for more details see Raufelder, Jagenow, Hoferichter, et al., 2013) to understand better the inter-individual differences in the configuration of motivation and academic achievement of early adolescent students. More precisely, inter-individual differences in students' socio-motivational dependency were examined through the theoretical concepts of achievement motivation, achievement goal orientation, self-regulation, academic achievement, and the empirical body of research on social relationships in the school context.

2.1.1 Achievement motivation.

Achievement motivation describes the willingness or desire to compare one's own action or the results of one's own actions with the existing standards along with a behavioral tendency to put effort and ensure that these quality standards are met or exceeded (McClelland, et al., 1953). Thus, the central elements of this motivation are self-assessment of one's own abilities and the associated positive emotions, such as pride and satisfaction. According to Atkinson (1957), achievement motivation is composed of two different aspirations, namely, *hope of success* and *fear of failure*. Hope of success refers to a tendency to feel pride from one's own performance. Students with a high tendency try to achieve and put more effort into doing so than students with low hope of success. In contrast, individuals driven by fear of failure tend more to feel shame in failure situations and, thus, avoid such situations. Both aspirations can be present in the same person, but they would differ in strength. A concept closely linked to achievement motivation but nevertheless distinctive from it is an orientation toward achievement goals.

2.1.2 Achievement goal orientation.

In general, a goal is a cognitive representation of the purpose for doing a task. Thus, achievement goals represent patterns of beliefs about the purpose for achievement and the standards that will be used to evaluate the effective performance (Pintrich, 2000). Achievement goal orientation refers to the representation of achievement goals as well as related persuasions about success, competence, purpose, effort, and ability.

In past research on achievement goals, different terms have been used to describe similar entities. For example, goals that orient a person toward completion of the task in order to learn how to do this task or mastering it have been called *task orientation* (Nicholls, 1984), *mastery goals* (Ames, 1992), or *learning goals* (Dweck, 1986). Goals that orient a person toward her own

abilities or performance relative to others have been called *ego-orientation* (Nicholls, 1984) or *performance goals* (Ames, 1992; Dweck, 1986). In the present study we were interested in learning goals because students with a high learning goal orientation tend to invest more effort in tasks in order to increase their performance in the long run, which has a positive effect on the level of performance.

2.1.3   Academic self-regulation.

In school, teachers and educators want students to be motivated to learn. Within the framework of their self-determination theory (SDT), Deci and Ryan (1985) distinguish between intrinsic (internal to the person) and extrinsic motivation (outside the person). Intrinsic motivation is a characteristic of contexts in which an activity is performed because it is interesting and satisfying, for example, an individual is experiencing positive feeling simply from performing the activity. In contrast, extrinsic motivation describes contexts in which an activity is performed in order to attain a specific outcome, for example, to obtain a tangible reward or to avoid punishment.

Furthermore, a distinction is made between autonomous and controlled motivation (Deci & Ryan, 2000b; R. M. Ryan & Deci, 2000b). Autonomous motivation describes a behavior characterized by a strong sense of volition and freedom. Here, people who are intrinsically motivated have their basic need for autonomy satisfied. In contrast, controlled motivation describes a behavior characterized by pressures or forces that are perceived as external to the self.

2.1.4   Social relationships at school.

The nature of the social relationships that one creates and maintains at school can enhance or undermine his or her academic motivation (Deci & Ryan, 2008; Reeve, 2006). On the

one hand, the role of peers in one's academic motivation and social engagement at school have been recently examined (Juvonen & Wentzel, 1996; Ladd, Herald-Brown, & Kochel, 2009; Wentzel, 2005, 2009a, 2009b; Wentzel, et al., 2010). A student's feelings toward and attitudes regarding the academia can be strongly influenced by and vary with the changing attitudes of the peer group (A. M. Ryan, 2001). Additionally, students demonstrate more academic motivation when they are accepted by their peers or enjoy mutual friendships (e.g., Wentzel & Asher, 1995; Wentzel, et al., 2004). Students without friends reported lower grade point averages (GPAs) than those with reciprocated friendships (Wentzel, 1993).

On the other hand, a positive character of the relationships that the student maintains with his or her teachers is associated with higher levels of overall classroom motivation (Wentzel & Caldwell, 1997), academic engagement (e.g., Buhs & Ladd, 2001), academic self-efficacy (e.g., Hughes & Chen, 2011), academic skills (e.g., Baker, 2006), and school adjustment (e.g., Wang, 2009). For example, academic engagement is stronger in students when they are well-liked by their teachers (Wentzel & Asher, 1995) or when they perceive that their teachers care about them (Roeser, Midgley, & Urdan, 1996). In addition, students receive better grades when they have positive views of teachers (Crosnoe, Johnson, & Elder Jr, 2004). Overall, student interest in the academia has been associated with stronger social and emotional support from teachers and peers (Wentzel et al., 2010).

2.1.5 Preliminary research.

Four types of socio-motivational dependencies have been proposed in the literature (Raufelder, 2007) based upon the differential perception of social relationships and their impact on academic motivation for students. Socio-motivational dependency exists when one's personal motivation is affected by the motivation of others, their learning behavior, or the perceived

support. Specifically, within the school context, a student's motivation can be predominantly affected by motivation, learning behavior, or social support from peers and/or through teachers' motivation and perceived support (Raufelder, Drury, et al., 2013; Wentzel, 2009a, 2009b). In contrast, socio-motivational independence exists when one's personal motivation is unaffected by other's motivation, learning behavior, or perceived support. Accordingly, a preliminary study using latent class (LC) analyses provided support for a typology that differentiated between four classes of socio-motivational dependency (Raufelder, Jagenow, Drury, et al., 2013): (1) teacher-dependent motivation type (MT), (2) peer-dependent MT, (3) teacher-and-peer-dependent MT, and (4) teacher-and-peer-independent MT. The teacher-dependent MT is mainly affected by teachers' own motivation for their subject as well as their support, including the awareness of students' abilities or success with the learning material. In contrast, the peer-dependent MT is mainly affected by classmates' motivation or learning behavior. The teacher-and-peer-dependent MT is affected by both teachers and peers. Finally, the teacher-and-peer-independent MT is unaffected by teachers' and peers' motivation, learning behavior, and support. The typology indicates that there are inter-individual differences in students' socio-motivational patterns, which should be carefully considered to foster each student individually. Thus, to support the learning process of each student in the classroom by accommodating their motivational preferences, it is important to empirically determine who (i.e., teachers, peers, oneself) or what (i.e., learning behavior, support) is depended on as a source of motivation.

2.1.6 Present study.

Because little is known about the underlying characteristics of the individuals within each type of socio-motivational dependency outlined above, the aim of the present study was to assess the four types more closely in terms of academic achievement, motivation, and social

relationships at school. Therefore, we extend the measurement model from the preliminary study by a structural model in which both models are estimated using a rather new three-step approach. Specifically, we combined an existing LC model with a multinomial logistic regression model to one conjoint model where both models are estimated separately in order to examine whether the LCs were explained by various covariates. However, to our knowledge, this type of model has not been used in an educational psychological research context before.

The purpose of the present study was to extend an existing model by including explanatory variables to predict different expressions of socio-motivational dependency. By using a multinomial logistic regression, we aimed to demonstrate that academic achievement, motivation, and relationships with different significant others can predict the belonging to each motivation type.

2.1.7 Hypotheses.

Based on the theoretical and the empirical background outlined above, the current study examined the following three hypotheses:

H1: Because the motivation types are relationship-oriented, we propose that the quality of relationship is one important factor leading to a specific MT. In detail, we assumed that the quality of the teacher-student relationship is a positive predictor for the teacher-dependent motivation type, whereas the quality of the student-student relationship should be a predictor for peer-dependent motivation. In addition, the quality of both the student-student relationship and the teacher-student relationship were expected to be positive predictors for the teacher-and-peer-dependent MT. In contrast, the quality of both the student-student relationship and the teacher-student relationship were expected to be negative predictors for the teacher-and-peer-independent MT.

H2: Achievement drive, learning goals, and intrinsic motivation are positive predictors for the teacher-and-peer-dependent motivation type, based on the assumption that students high in these are generally more motivated, because it is assumed that they perceive more support from their teachers and peers. For the teacher-and-peer-independent MT, in contrast, we hypothesized that they might be negative predictors.

H3: Finally, we hypothesized that academic achievement is a positive predictor for the teacher-and-peer-dependent MT, based again on the assumption that these students perceive the most support in school.

2.2   Methods

2.2.1   Participants.

Participants were 1,088 7th and 8th grade students between the ages of 12 and 15 ($M =$ 13.7 years; $SD = .53$ years; 53.9% girls) from 23 randomly chosen secondary schools in a suburban, predominantly middle-class community in Brandenburg, Germany. Written consent was obtained from participants' parents prior to data collection.

2.2.2   Procedures.

As part of a broader investigation of socio-motivational relationships, participants were asked to complete questionnaires assessing teachers and peers as positive motivators, respectively, the character of teacher-student and student-student relationships, as well as different aspects of academic motivation, namely, achievement motivation, achievement goal orientation, and self-regulation. For each class of students, the data were collected on two consecutive days. In addition to informing the students how to complete the questionnaires, researchers reassured them that participation in the study was voluntary, that they were not

obliged to answer any questions, and that their responses would remain confidential. The study

was approved by the state of Brandenburg's Department of Education, Youth, and Sport.

2.2.3   Measures.

2.2.3.1   *Teacher and peers as positive motivator*

We assessed students' individual perception of teachers and peers as positive motivators

using the self-report Relationships and Motivation scale (REMO; for more details, see

(Raufelder, Drury, et al., 2013). The subscale *teachers as positive motivators* (TPM) consists of

six items (e.g., "If the teacher is really interested, I am interested as well"; subscale's internal

consistency: Cronbach's α = .78, M = 3.08, SD = 0.50). The subscale *peers as positive motivator*

(PPM) consists of nine items (e.g., "If my friends want to do better in school, I also want to do

better"; Cronbach's α = .80, M = 2.55, SD = 0.51). We chose these two subscales because of the

likely importance of the positive effects of teachers and/or peers on students' academic

achievement and motivation. Responses were given on a 4-point scale ranging from 1 (*strongly*

disagree) to 4 (*strongly agree*).

2.2.3.2   *Social relationships at school*

To assess the individual perceived quality of the teacher-student and student-relationships

we used two scales from Kunter and colleagues (2002): The scale *teacher-student relationship*

consists of five items (e.g., "I get along well with most teachers"; Cronbach's α = .78, M = 2.85,

SD = .50). The scale *negative student-student relationships* consists of six items (e.g., "In our

class there are some students who are respected by other little."; Cronbach's α = .69, M = 2.35,

SD = .53). Responses were given on a 4-point Likert-scale ranging from 1 (*not true at all*) to 4

(*totally true*).

2.2.3.3   Academic achievement

Students reported the grades they received in mathematics and German in their prior half and end of the year report cards. These responses, ranging from 1 (A) to 6 (F), were averaged across time.

Achievement motivation Students' individual level of achievement motivation was assessed with the *Achievement Motivation Questionnaire for Students 7th to 13th grade* (Petermann & Winkel, 2007). Items were responded to on a 5-point Likert-scale ranging from 1 (*not true at all*) to 5 (*totally true*). The subscale *achievement drive* assesses such constructs as hope of success, learning goals, and performance goals (e.g., "At school I want to be one of the best students"; $M = 3.13$, $SD = 0.72$). The subscale *effort* focuses on the aspects of volition, such as self-control and discipline (e.g., "Nothing can disturb me while I'm studying or working"; $M = 3.04$, $SD = 0.70$). The subscale *activating test anxiety* assesses whether individuals perceives themselves as nervous but nevertheless efficient in challenging situations (e.g., "I do better in tests, if I am a bit nervous beforehand"; $M = 2.43$, $SD = 0.80$). Finally, the subscale *inhibitory test anxiety* measures one's fear of failure in challenging situations and the tendency to avoid such situations when possible (e.g., "If I have to solve a difficult task, I am afraid I will fail"; $M = 3.23$, $SD = 0.79$). Internal consistency of the four subscales was satisfactory (Cronbach's α ranging from .71 – .83).

2.2.3.4   Achievement goal orientation

Students' individual level of achievement goal orientation was assessed with the *Scales for the Assessment of Learning and Achievement Motivation* (Spinath, Stiensmeier-Pelster, Schöne, & Dickhäuser, 2002). Responses to items were given on a 4-point Likert-scale ranging from 1 (*not agree*) to 4 (*totally agree*). The subscale *learning goals* assesses how much an

individual strives to expand their own skills or learn something when completing a task (e.g., "I

go to school to learn new ideas"; Cronbach's α = .83, M = 2.96, SD = 0.51). The subscale

performance goals measures the tendency to demonstrate knowledge and skills (e.g., "At school,

I want to show my competence"; Cronbach's α = .79, M = 2.67, SD = 0.52).

2.2.3.5 Self-regulation

Students' individual level of self-regulation was assessed using the German adaptation of

the *Academic Self-Regulation Questionnaire* (Müller, Hanfstingl, & Andreitz, 2007). Items were

responded to on a 5-point Likert-scale ranging from 1 (*not true at all*) to 5 (*totally true*). Internal

consistency (Cronbach's α) of the subscale *intrinsic motivation* (e.g., "I do my class work

because it is fun"; M = 4.00, SD = 0.73) and of the subscale *extrinsic motivation* (e.g., "I do my

homework because I'll get in trouble if I don't"; M = 2.47, SD = 0.82) was .81 and .68,

respectively.

All the internal consistency coefficients, means, and standard deviations reported here are

based on the current data set.

2.2.4 Statistical analysis.

Our analysis is based on the LC analysis that led Raufelder, Jagenow, Drury, and

colleagues (2013) to identify four types of socio-motivational dependency using the same data.

To predict socio-motivational dependency class membership we used the newly developed three-

step approach of LC regression introduced by Vermunt (2010). In order to use observed variables

as predictors for latent classes in a logistic regression analysis, the LC model (measurement

model) and the logistic regression model (structural model) are usually combined into one joint

model which can be estimated simultaneously (one-step approach) (e.g., Bandeen-Roche,

Miglioretti, Rathouz, & Zeger, 1997; Dayton & Macready, 1988). However, the purpose of the

present study was to extend an existing model by including explanatory variables to predict classes identified by Raufelder, Jagenow, Drury, and colleagues (2013). Because we used the same data, it is essential that the latent class structure is maintained. The three-step approach (Vermunt, 2010) was developed precisely for such a purpose.

In this stepwise approach, the LC model is built first, even though the regression and the LC model are combined into one model. In the second step, individuals are assigned to the LCs based on their posterior class membership probabilities obtained from step one. This is the same as in a LC analysis without covariates. The estimated mean assignment probabilities for participants are above .81 (Raufelder, Jagenow, Drury, et al., 2013). However, when assigning individuals to one or another class, this might lead to misclassification errors because class membership probabilities are not always exactly one. Therefore, Vermunt (2010) introduced a procedure by defining a model in which the step two class assignments serve as a single response variable with known measurement error probabilities. In step three, a multinomial logistic regression model is estimated using the class assignment from step two as the observed dependent variables. The advantage of this three-step approach is that one cannot only introduce predictor variables while keeping the measurement model fixed but the misclassification errors in the LCs are also taken into account. The strength of the three-step approach has been successfully demonstrated (Asparouhov & Muthén, 2012; Vermunt, 2010).

An alternative procedure is to estimate the LC model and extract the classes for further analysis. For example, the classes could be used as independent variables in a multivariate analysis of variance (MANOVA). However, this is problematic because, as mentioned above, when assigning individuals to a class based on the most likely class this is associated with misclassification errors. Each individual of a class would be treated as if they have the same

probability of 1.0 of being in the class. A MANOVA could not account for these errors, and results would be misleading. Standard errors could be incorrect which can lead to inaccurate conclusions about the significance of an effect.

Because the LC model is based on the same data as in Raufelder, Jagenow, Drury, and colleagues (2013), and the measurement model and the structural model are estimated separately, the model fit criteria of the measurement model in the current study were the same as those in the Raufelder, Jagenow, Drury, and colleagues study. Statistical fit of the model to the data was satisfactory (i.e., when assessed with AIC, BIC, sample size adjusted BIC, and entropy). Using 3 parcels of the original 6 items (3 parcels consisting of 2 items) of the REMO subscale *teacher as positive motivator* and the original 9 items (3 parcels consisting of 3 items) of the REMO subscale *peers as positive motivator*, the LC model was estimated. To predict the extracted LCs, the independent variables in the logistic regression were grades in mathematics and German, the seven subscales from the three questionnaires assessing different types of motivation, and the two scales measuring the perceived quality of one's social in-school relationships: *teacher-student relationships* and *negative student-student relationships*. All the analyses were carried out in Mplus 7 (L. K. Muthén & Muthén, 1999-2012). To account for missing data, models were estimated with full information maximum likelihood (FIML).

2.3   Results

Table 1 shows means and standard errors of the means for of the dependent variables used as covariates in the logistic regression for each MT separately. Table 2 shows the results of the multinomial logistic regression conducted to assess whether different achievement, motivational, and social variables are predictors for the distinctive motivational types. Overall, with respect to the entire set of covariates, achievement drive, learning goals, intrinsic motivation, mathematics

grades, activating and inhibitory test anxiety, and the teacher-student relationship seemed to be substantial predictors of the differences in the assignment of participants to the four LCs. However, none of the variables assessed in the present study discriminated between the teacher-dependent and the peer-dependent MT (class 2 vs. class 3).

More precisely, the higher the student's intrinsic motivation, the higher the chance she or he belongs to the teacher-and-peer-dependent motivation type (class 1), when compared to all other types. Students more oriented toward learning goals are more likely to belong to the teacher-and-peer-dependent type (class 1) than to the peer-dependent (class 3) and teacher-and-peer-independent motivation type (class 4). Furthermore, students are more likely to belong to the teacher-and-peer-dependent motivation type (class 1) than to the teacher-and-peer-independent motivation type (class 4) with higher scores on the achievement drive dimension. Additionally, the higher the student scores on the dimension of teacher-student relationship, the higher the chance of belonging to the teacher-and-peer-dependent (class 1) than the independent motivation type (class 4).

Table 1   *Group means*

Variable	Type I (n = 292) teacher- and peer-dependent MT		Type II (n = 107) teacher-dependent MT		Type III (n = 394) peer-dependent MT		Type IV (n = 295) teacher- and peer-independent MT	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
1. Mathematics grade	2.68	1.01	2.63	0.97	2.59	0.93	2.62	0.94
2. German grade	2.34	0.85	2.47	0.89	2.35	0.85	2.50	0.91
3. Achievement Drive	3.48	0.75	3.27	0.94	3.16	0.77	2.74	0.88
4. Effort	3.24	0.79	3.22	0.96	3.06	0.77	2.78	0.84
5. Activating Test Anxiety	2.64	1.09	2.41	1.07	2.43	0.87	2.24	0.84
6. Inhibitory Test Anxiety	3.42	0.89	3.37	1.03	3.31	0.93	2.91	0.91
7. Learning Goals	3.21	0.53	3.09	0.71	2.94	0.50	2.71	0.67
8. Performance Goals	2.92	0.56	2.72	1.02	2.67	0.50	2.43	0.65
9. Intrinsic Motivation	4.38	0.67	4.12	0.89	3.95	0.91	3.66	1.08
10. Extrinsic Motivation	2.63	1.09	2.36	1.02	2.42	0.93	2.43	0.93
11. Neg. Student-student Relationships	2.48	0.70	2.40	0.88	2.31	0.58	2.26	0.55
12. Teacher-student Relationships	3.00	0.58	2.97	0.74	2.84	0.54	2.68	0.60

Table 2   *Results from multinomial logistic regression analyses*

Covariate X	Reference Class1			Reference Class2		Reference Class3
	C2 on X	C3 on X	C4 on X	C3 on X	C4 on X	C4 on X
Mathematics	-0.326	-0.447*	-0.720***	-0.122	-0.395	-0.273
German	0.292	0.173	0.351	-0.119	0.059	0.178
achievement drive	-0.157	-0.249	-0.772*	-0.092	-0.615	-0.523
effort	0.072	0.035	-0.041	-0.037	-0.113	-0.076
activating test anxiety	-0.212	-0.126	-0.417*	0.086	-0.203	-0.291
inhibitory test anxiety	0.051	-0.143	-0.777***	-0.194	-0.827*	-0.633***
learning goals	-0.210	-0.784*	-1.228**	-0.575	-1.018	-0.444
performance goals	-0.373	-0.348	-0.634	0.024	-0.262	-0.286
intrinsic motivation	-0.788*	-0.961***	-1.093***	-0.173	-0.306	-0.133
extrinsic motivation	-0.250	-0.142	0.069	0.108	0.319	0.211
neg. student-student relationship	0.047	-0.409	-0.559	-0.456	-0.606	-0.150
teacher-student relationships	0.156	-0.376	-0.687*	-0.532	-0.842	-0.310

Note: Class 1 = teacher-and-peer-dependent MT; Class 2 (C2) = teacher-dependent MT; Class 3 (C3) = peer-dependent MT; C4 = teacher-and-peer-independent MT; Significance: * $p < .05$; ** $p < .005$; *** $p < .001$

In contrast, with worsening grades in mathematics (1 is best, 6 is worst), students are more likely to belong to the teacher-and-peer-dependent motivation type (class 1) compared to the teacher-and-student-independent motivation type (class 4) and compared to the peer-dependent motivation type (class 3). Moreover, students who score low on inhibitory test anxiety are more likely to belong to the teacher-and-peer-independent motivation type (class 4) compared to all other types. Finally, students who show low activating test anxiety are more likely to belong to the independent motivation type (class 4) compared to the teacher-and-peer-dependent motivation type (class 1). The variables effort, performance goals, and student-student relationships were not significant predictors of the differences in the assignment of participants to the four LCs.

2.4   Discussion

In order to provide a more in-depth picture of the inter-individual differences between four identified types of socio-motivational dependency, a person-oriented approach was employed. Specifically, the quality of social relationships, academic achievement, and motivational aspects within the classroom environment were assessed as predictors of socio-motivational dependency using a recently developed three step approach for estimations. In accordance with the second hypothesis, achievement drive, learning goals, and intrinsic motivation are the best predictors of the teacher-and-peer-dependent MT. These results corroborate other findings suggesting that having functional social relationships at school support academic motivation (e.g. Urdan & Schoenfelder, 2006). Interestingly, although the motivation of the teacher-and-peer-dependent MT depends strongly on both teachers and peers, the basic need for autonomy seems to be best satisfied since intrinsic motivation is highest.

In contrast, hypothesis 1, postulating that the quality of social relationships with teachers and peers are significant predictors of socio-motivational dependency, could not be confirmed. Only the teacher-and-peer-dependent MT reported higher teacher-student relationship quality compared to the independent MT. One reason for this result might be that the scale *negative student-student relationships* captures the class climate rather than the individual student-student relationship quality.

Furthermore, we have to reject hypothesis 3 which proposed that academic achievement is a positive predictor for the teacher-and-peer-dependent MT. The independent MT and the peer-dependent MT had better grades in mathematics than the teacher-and-peer-dependent MT even though the former display less learning goal orientation However, this finding is somehow surprising considering that people with a high learning goal orientation tend to invest more effort in tasks to increase their performance in the long run because learning is seen as "fun" (Dweck & Leggett, 1988). Moreover, achievement motivation and task-related goal pursuit have been related positively to academic achievement (e.g., Wentzel, 1993, 2000). One explanation might be that the independent MT experiences less inhibitory test anxiety and, therefore, achieves better in mathematics even the general motivation is not the highest. Beyond that, the independent type might be less affected emotionally by achievement situations in the class environment in general. Another explanation is that students who have better grades might be less affected by teacher influence.

For the remaining three types, the teachers and peers seem to be important agents in their daily school life, thus possibly making them afraid of being judged in test situations. Moreover, the dependency-like nature of these types suggests the perceived pressure to fulfill expectations of teachers and/or peers, which is the likely cause for test anxiety (Hoferichter, Raufelder, & Eid,

2014). However, this does not explain why the peer-dependent MT has better mathematics grades, particularly because this type did not differ in the level of inhibitory test anxiety compared to the teacher-and-peer-dependent MT but showed a lower level of inhibitory test anxiety than the independent type. An additional explanation might be the negative consequences of being "super-social", that is, the dependency on both peers and teachers, might result in students experiencing higher levels of social stress (i.e., teacher pressure) and institutional expectations (symbolized by the teacher-dependency). However, more research is needed on the impact of social relationships on socio-motivational dependency.

2.4.1 Strengths, limitations, and future research.

The present study complements previous findings and further enhances our understanding of socio-motivational dependency in adolescence. First, we investigated the role of the quality of both student-student and teacher-student relationships in academic motivation as well as taking the inter-individual differences into consideration. Second, we employed a person-oriented approach in which the configuration of variables was taken into account. Third, we employed a novel analytical method of three-step multinomial logistic regression with latent classes, which allows for estimating measurement model and structural model separately rather than simultaneously (e.g., one-step approach). Fourth, because a variety of constructs was assessed as predictors of students' socio-motivational dependency, a more comprehensive picture on the existing differences between the four motivation types could be provided. The present results highlighted the ambivalent role of socio-motivational dependency in academic achievement: While students of the "super-social" teacher-and-peer-dependent motivation type score the highest on motivation, the students belonging to the independent motivation type are less likely to experience inhibitory test anxiety and show better academic achievement.

Despite these strengths, the methodological limitations of the present study should be discussed. The non-experimental nature of the present design precludes any conclusions about the cause-effect relationships between the investigated constructs. The current results are also limited in their sole reliance on self-report measures. Specifically, self-reports could be particularly problematic for GPA that is often biased. Teacher reports could be used in addition to examine students' academic motivation and GPA. Notably, studies that have included teacher- and self-reports in motivation research reported low levels of concordance between information provided by multiple informants (Skinner & Belmont, 1993).

The current findings have important implications for educators and school psychologists: Students' individual motivation patterns and the divergent role of peers and teachers as a source of motivation should be carefully considered when designing curricula and learning environments, as well as when aiming to improve the existing intervention programs (e.g., Martin, 2008). Although new educational concepts, such as personalized learning schedules, learning diaries, learning journals, and student-centered learning are being developed and implemented in school, many schools in Western societies still expect students to learn and behave in uniform ways, which results in labeling nonconforming students as maladjusted instead rather than, as the current study shows, possessing different socio-motivational needs. However, more research is needed to investigate the astonishing result that higher motivation was paired with lower academic achievement. In future studies, high motivation students could be asked if they view achievement differently than a standard grade. Importantly, further studies employing longitudinal designs are required to evaluate the stability of these dependencies over time. Taken together, the present findings highlight the importance of inter-individual differences for students' academic motivation, which provide clear practical implications for the learning and

teaching tools used on a daily basis in schools, but which also provide a novel theoretical

perspective into the interplay between social relationships and motivation in classroom

environments.

Chapter 3: **Article 2**

The development of socio-motivational dependency from early to middle

adolescence

3.1   Introduction

Therefore, the present study employed a longitudinal design to better understand intra- and inter-individual changes regarding peers and teachers as source of motivation, which Raufelder, Jagenow, Dury, and Hoferichter (2013) have termed socio-motivational dependency. Socio-motivational dependency exists when students' academic motivation is affected by peers' motivation, learning behavior and social support or teachers' motivation and social support or both (Raufelder, Drury, et al., 2013; Wentzel, 2009a, 2009b). In contrast, socio-motivational independence exists when the motivation of individuals is unaffected by others' motivation, learning behavior or perceived support.

Research has shown that the level of students' academic motivation changes as they move through adolescence (Wentzel, 2009b). Namely, the motivation of many students decreases with each school year, due to changes both in social processing and in the school environment (Eccles & Midgley, 1990; Wigfield, Eccles, & Rodriguez, 1998). Interestingly, students react in different ways to these changes: While some individuals start to resile from achievement situations and avoid such contexts whenever possible, others might not be negatively affected by the changes at all (Wigfield & Eccles, 2001). In other words, they show comparable levels of school achievement and motivation to learn throughout adolescence (Deci & Ryan, 2000a) which seem to be independent of the teachers who instruct them or the classmates who surround them (Raufelder, Drury, et al., 2013).

A framework that helps to understand these divergent findings in adolescent motivation is 'developmental contextualism' (Lerner, 1986, 1991, 1998), that is, a theory of human ontogenetic development that focuses on the changing relations or coactions between the developing individual and his or her context. This theory argues that the development of the person-in-context is depicted as a function of dynamic processes embedded in multilevel interactions between a person and his or her contexts. This suggests that in the context of academic motivation, teacher-student relationships and student-student relationships might play a critical role in adolescence. In line with the work of Hamre and Pianta (2006), who applied developmental contextualism to better understand the importance of the teacher-student relationship for academic motivation, academic motivation can be understood to be one component of a dynamic process involving the interplay between the developing adolescent and his or her school context (i.e., teacher relationships, peer relationships). Taken together, the evidence of inter-individual differences in students' socio-motivational dependency and the contextual changes over time suggests that also intra-individual changes within the developing individual might take place.

3.1.1 Peers and motivation in adolescence.

In the context of emotional and behavioral attitude toward school, the relationships that students have with their classroom peers have been repeatedly shown to play a critical role (e.g. Furrer & Skinner, 2003; Ladd, et al., 2009; A. M. Ryan, 2001; Wentzel, et al., 2010; Zimmer-Gembeck, et al., 2006). For example, in a longitudinal study of adolescents, students who had better relationships with peers at school were more likely to display greater emotional engagement at school (Furrer & Skinner, 2003). Furthermore, the adolescents' peer group context predicts the levels of school achievement and intrinsic school values (e.g., enjoyment,

linking) after one year (A. M. Ryan, 2001). Ladd and colleagues (2009) argued that peer relationships promote students' motivation by increasing student participation, and providing support and assistance, which increases students' school engagement, as well as the overall levels of learning and academic competence.

Research on the development of social relationships during childhood and adolescence found that with the beginning of adolescence individuals spent a large part of their time in school and interact with their peers thus, it is possible that peers have an increasing impact on students' school engagement as have teachers or parents (e.g., Brown, 1990; Csikszentmihalyi & Larson, 1984; Hymel, et al., 1996; Levitt, 2005; Rohrbeck, 2003). One possible explanation for this behavior is that young adolescents have strong needs for social identity and spending time with peers satisfies these needs stronger than spending time with family members (Csikszentmihalyi, Larson, & Prescott, 1977; Youniss, 1980). Moreover, this period of time in one's life is accompanied by significant changes in the nature of relationships with peers (e.g., Dubow, Tisak, Causey, Hryshko, & Reid, 1991; Larson & Richards, 1991). For example, in a study with children and adolescents, participants perceived parents and friends as equally supportive for the ages 9-15 but for the years 16-18 friends' support exceeded parents' support (Bokhorst, et al., 2010). Dubow and colleagues (1991) found that changes from third through fifth graders in the received peer support were closely related to changes in their school adjustment two years later, which reflects the growing influence of peers during early adolescence. Other findings suggest, that adolescents whose friends do well in school or have a positive attitude toward school show fewer academic problems (e.g., disengagement) than those whose friends are less academically engaged (Crosnoe, et al., 2003). Overall, it is reasonable that during adolescence peers play an increasingly stronger role in shaping one's academic motivation because they satisfy one's needs

for close relationships, emotional or behavioral support, as well as influence one's attitude toward school.

3.1.2 Teachers and motivation in adolescence.

In contrast, the quality of relationships with adults declines from the age of 12 to 18 (e.g., Kenny, Dooley, & Fitzgerald, 2013). In spite of the fact that teachers are the primary adult figures in the academic context, support from teachers declines from the age of 12 to 18 (Bokhorst, et al., 2010). Moreover, the strength of the association between teachers' support and students' motivation decreases with each year passing (Goodenow, 1993). A critical time point seems to be moving from elementary school to secondary school (Eccles, et al., 1993), at which point the decline in the teacher-student relationship quality coincides with a growing need in young adolescents for close emotional relationships with adults from outside of the home environment (Midgley, Feldlaufer, & Eccles, 1989; Raufelder, 2007; Raufelder, Bukowski, et al., 2013).

There is a large body of research focusing on the link between teacher-student relationships and important academic outcome (e.g. Baker, 2006; Davidson, et al., 2010; Hughes, 2012; Wentzel, et al., 2010; Zimmer-Gembeck, et al., 2006). Positive teacher-student relationships are associated with higher academic skills (e.g., Baker, 2006), classroom motivation (Wentzel, 1998), and social engagement (Gest, et al., 2005). For example, middle school students tend to be more academically active in the classroom when they get positive feedback from their teachers (Skinner & Belmont, 1993), when they believe that their teachers care about them (Roeser, Midgley, & Urdan, 1996), or when they are well-liked by their teachers (Wentzel & Asher, 1995). However, only few longitudinal studies have investigated the developmental changes of those associations (e.g., Furrer & Skinner, 2003; Hamre & Pianta, 2001; Murdock,

Anderman, & Hodge, 2000; Skinner, Zimmer-Gembeck, Connell, Eccles, & Wellborn, 1998).

Hence, very little is known about the changes in the importance of these relationships for

motivation and school achievements after grade eighth. "Although we generally know more

about these relationships at the elementary level, there is good reason to think that they are

especially critical during secondary school" (Gehlbach, et al., 2012, p. 692).

3.1.3   Preliminary studies.

Raufelder, Jagenow, Dury, and Hoferichter (2013) examined inter-individual differences in

how important teachers and peers are in shaping the level of students' academic motivation –

termed as socio-motivational dependency. Within the school context, students' motivation can be

predominantly affected by peers' motivation, learning behavior and social support or teachers'

motivation and support or both (Raufelder, Drury, et al., 2013; Wentzel, 2009a, 2009b).

Accordingly, students whose motivation is not affected by peers and teachers show socio-

motivational independence. Research revealed four different types of what is termed as socio-

motivational dependency: (1) a teacher-dependent motivation type (MT), (2) a peer-dependent

MT, (3) a teacher-and-peer-dependent MT, (4) a teacher-and-peer-independent MT (Raufelder,

Jagenow, Drury, et al., 2013). The teacher-dependent MT can be described as a student whose

academic motivation is predominantly affected by the teacher's characteristics and perceived

support, such as awareness of the student's abilities or the teacher's own motivation and interest

in the subject. In contrast, the peer-dependent MT represents a student whose motivation is

predominantly affected by the behavior of her or his peers, such as classmates' interests,

motivation or the amount of effort they put into studying. In turn, the teacher-and-peer-dependent

MT is a mixed type because academic motivation of such a student is affected by both teachers'

and peers' characteristics. Finally, the teacher-and-peer-independent MT is unaffected by

teachers' and peers' motivation, learning behavior and support. The sources of motivation of this type lie elsewhere than her or his teachers or peers.

Literature, investigating the link between relationships at school and motivation points to the existence of different forms of support teachers and peers can provide. Wentzel and colleagues (Wentzel, et al., 2010; Wentzel, Donlan, & Morrison, 2012) distinguish between multiple classroom support: providing help, providing emotional support, creating a save environment, and communication of expectations and values. However, in the present study such distinctions were not made. Our interest was not only in support but also in students' perceptions of teachers' motivation for the subject, the awareness of students' abilities or success with the material, and peers' learning behavior. The perception of these important classroom aspects is affecting most individuals' motivation and achievement behavior. For example, when teachers show motivation for their subjects, students are expected to show more motivation as well, which is true for the subtypes teacher-dependent and teacher-and-peer-dependent MT (Raufelder, Jagenow, Drury, et al., 2013). However, it should be underlined that there are many students, whose motivation is unaffected by teachers and peers at all – the teacher-and-peer-independent MT.

The study by Raufelder, Jagenow, Dury, and colleagues (2013) is one of the few that examined the joint influence of teachers and peers on students' academic motivation (see also Wentzel, et al., 2010). It is also one of a few rare studies that used a person-oriented rather than a variable-oriented approach in this area of research. The variable-oriented approach focuses on purely additive effects of the variables of interest (see Davidson, et al., 2010), by ignoring interactions between the variables (Raufelder, Jagenow, Hoferichter, et al., 2013; Rosato & Baer, 2012). One of the few person-oriented studies in the field of educational psychology was

conducted by Furrer and Skinner (2003), who investigated the importance of children's

relatedness (e.g., feelings of acceptance, interpersonal support) to teachers and parents. The

authors found that positive experiences in one relational context may buffer the impact of

negative relational experiences in another context. This study also demonstrated an important

advantage of the person-oriented approach, that is, it is designed to identify subgroups in the

population that are characterized by a particular combination of values on a set of variables

(Bergman & Magnusson, 1997; von Eye & Bergman, 2003). Furthermore, the person-oriented

approach aims to group individuals into categories, where each contains individuals that are

similar to each other and different from the individuals in other categories (B. O. Muthén &

Muthén, 2000).

3.1.4   Present study.

The aim of the current study was twofold. The first aim was to examine inter-individual

differences in adolescent students' socio-motivational dependency. Specifically, we tested

whether the four types of socio-motivational dependency found in seventh and eighth graders

(Raufelder, Jagenow, Drury, et al., 2013) can be identified within the same cohort approximately

two years later. The second aim of the present study was to describe the intra-individual

development of students' socio-motivational dependency from early to middle adolescence. We

examined this age group because students' motivation declines after the transition to secondary

school and continues to do so for the first three years of high school (Harter, 1996), reaching its

nadir in the ninth grade (Eccles & Wigfield, 1998).

Based on these preliminary studies, the empirical findings outlined above and Lerner's

developmental contextualism (Lerner, 1986, 1991, 1998), the current study examined the

following two hypotheses:

Hypothesis 1: (1a) Overall, the same four types of socio-motivational dependency that were found in grade seven and eight (Raufelder, Jagenow, Drury, et al., 2013) should be identified in grade nine and ten. (1b) More specifically, based on findings that peers become more important while adults become less important agents during adolescence (e.g., Juvonen & Wentzel, 1996), the size of the teacher-dependent MT group should decrease and the size of the peer-dependent MT should increase from early to middle adolescence.

Hypothesis 2: Based on Lerner's contextualism considering changing relations or coactions between the developing individual and his or her context over time (Lerner, 1986, 1991, 1998), it was hypothesized that individuals will vary in their socio-motivational dependency from early to middle adolescence. In particular, we assumed that the three socially dependent MTs would show higher fluctuation rates compared to the teacher-and-peer-independent MT.

3.2   Method

3.2.1   Participants.

We initially examined 1088 participants aged 12 to 15 years (mean age = 13.7 years, SD = .53 years; 53.9 % girls), who were sampled from a group of seventh- and eighth-grade students from 23 randomly chosen secondary schools in a suburban, predominantly middle-class community in Brandenburg (Germany). At the second time point, approximately two years later, 783 students (mean age = 15.3 years, *SD* = .50 years; 53.5% girls) of the initial sample remained in the study (72.0% retention rate; sex, age, and MT at the first occasion of measurement were no predictors of drop-out.). Data on ethnicity was not collected due to low ethnic diversity in Brandenburg and socio-economic information was not gathered due to laws in Germany prohibiting the collection of such data via a third party. The study was approved by the Department of Education, Youth and Sports of Brandenburg. Consent was obtained from parents,

and assent was provided by the participants. Parents and students were informed that the survey would be voluntarily, anonymous and confidential.

3.2.2   Procedure and measures.

At the beginning of the German school year, self-report measures of students' perception of peers and teachers as positive motivators were collected during class time on two consecutive days. For this purpose, two subscales from the Relationship and Motivation Scale (REMO; Raufelder, Drury, et al., 2013) were used: (1) 'Teachers as positive motivators' (TPM, 6 items; e.g., "If the teacher is really interested in the topic, I am interested as well"; internal consistency at the first time point (T1): Cronbach's $\alpha = .78$; internal consistency at the second time point (T2): Cronbach's $\alpha = .78$), (2) 'Peers as positive motivators' (PPM, 9 items; e.g., "If my friends want to do better at school, I also want to do better."; internal consistency at T1: Cronbach's $\alpha = .80$; internal consistency at T2: Cronbach's $\alpha = .83$). These two subscales assess the positive influence of teachers and peers on academic motivation, respectively. In both subscales, responses are measured on a 4-point Likert scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*). The same measures were collected again using identical testing procedures after approximately two years.

3.2.3   Analysis.

3.2.3.1   Latent class analysis (LCA) on the second occasion of measurement.

We employed a latent class approach to identify different groups of socio-motivational dependency at T2. Our analyses are based on the LCA that led Raufelder, Jagenow, Dury and colleagues (2013) to identify four motivation types at T1. In their analysis parcels from the PPM and TPM items were created and dichotomized. Therefore, prior to conducting LCA, parcels were create from the 9 items of the REMO subscale PPM and from the 6 items of the REMO

subscale TPM determined by the initial factor analysis of the REMO validation study (Raufelder,

Drury, et al., 2013). Little, Cunningham, Shahar, and Widaman (2002) list three reasons that

parceling can be advantageous over using the original items: 1) estimating large numbers of

items is likely to result in spurious correlations, 2) subsets of items from a large item pool will

likely share specific sources of variance that may not be of primary interest, and 3) solutions

from item-level data are less likely to yield stable solutions than solutions from parcels of items.

Based on these considerations as well as the unidimensionality of the Peer-REMO subscales (P-

REMO), items of PPM were randomly assigned to parcels. In contrast, the items of TPM were

assigned to parcels based on a factor analysis, as the Teacher-REMO subscales (T-REMO) are

not unidimensional.

Using LCA, participants can be grouped into classes, in which individuals are assumed to

have identical patterns of solution probabilities. For analyzing T2 data several models, where

each is differentiated by the number of latent classes, were compared to determine which model

best fits the observed data. Using an iterative process, we initially chose a two-class solution and

increased the number of classes incrementally until a good fit was achieved. Statistical model fit

criteria were employed to determine the optimal number of classes. The statistical criteria used to

guide this process were the lowest Akaike Information Criteria (AIC; Akaike, 1973), the lowest

Bayesian Information Criteria (BIC; Schwarz, 1978), and the lowest sample-size adjusted BIC

(a. BIC). Values of these criteria are useful to compare the fit of one model with the fit of other

models. Additionally, the Bootstrap Likelihood Ratio Test (BLRT; McLachlan & Peel, 2000) was

conducted to test the statistical significant benefit of a model ($p < .05$). The BLRT compares the

fit of a model with 'g' latent classes versus that with 'g minus one' latent classes (H0). In a

Monte Carlo simulation, the BLRT was demonstrated to be a consistent and robust indicator of the presence of additional latent classes (Nylund, Muthén, & Asparouhov, 2007).

3.2.3.2 *Latent transition analysis (LTA).*

To investigate individuals' transition between latent classes over time, we employed latent transition analyses, which combines latent class analysis with autoregressive modeling (specifically Markov models; Langeheine & Van de Pol, 1990), where the latter describes transitions among the classes associated with time passing.

Several models were compared to determine which model corresponds best to the observed data. The models differed in their restrictions: The fully restricted model assumes that: (a) conditional probability and (b) class size are the same for each of the classes across time. In contrast, the unrestricted model makes no assumptions about equality of the measurement parameters across the classes and time. Finally, the semi-restricted model involves an assumption that conditional probabilities are invariant but allows the class sizes to be estimated freely across time.

Using an iterative process, we started with a two-class solution for the two occasions of measurement and increased the number of classes incrementally. Additional classes were added until a good fit was achieved. Statistical model fit criteria were used to determine the optimal restriction and number of classes. The statistical criteria used to guide this process were the lowest AIC, BIC, and sample-size adjusted BIC.

To account for missing data, models were estimated with full information maximum likelihood (FIML). All of the models in the present study were analyzed using the statistical software Mplus 7.11 (L. K. Muthén & Muthén, 1999-2012).

3.3 Results

3.3.1 LCA for the second occasion of measurement.

Table 1 shows model-fit results for the LCA at T2 for the two through five class models. According to the AIC, BIC and sample-size adjusted BIC (lowest values) the 4-class solution (model 3) had the best fit to our data. Furthermore, the BLRT indicated that model 4 is not superior to model 3. The classification quality of the model was satisfactory (entropy = .68). Figure 1 shows the estimated conditional class-specific probabilities to agree with the underlying indicator variables. Membership of the 4-class solution was as follows: 17.7% teacher-and-peer-dependent MT (74 girls and 64 boys), 19.8% teacher-dependent MT (83 girls and 72 boys), 35.2% peer-dependent MT, (148 girls and 129 boys), and 27.2% teacher-and-peer-independent MT (114 girls and 99 boys).

Table 1

Model fit results for LCA for the second occasion of measurement

	Statistical Fit Criteria			BLRT
	AIC	BIC	a. BIC	
1. Model: 2 classes	6248.939	6310.581	6269.297	.000
2. Model: 3 classes	6096.016	6190.850	6127.336	.000
3. Model: 4 classes	**6002.511**	**6130.537**	**6044.793**	.000
4. Model: 5 classes	6010.158	6161.376	6053.402	.105

Note: AIC = Akaike Information Criteria, BIC = Bayesian Information Criteria, a. BIC = sample-size adjusted Bayesian Information Criteria, BLRT = Bootstrap Likelihood Ratio Test. Statistical fit criteria of the superior model are bold.
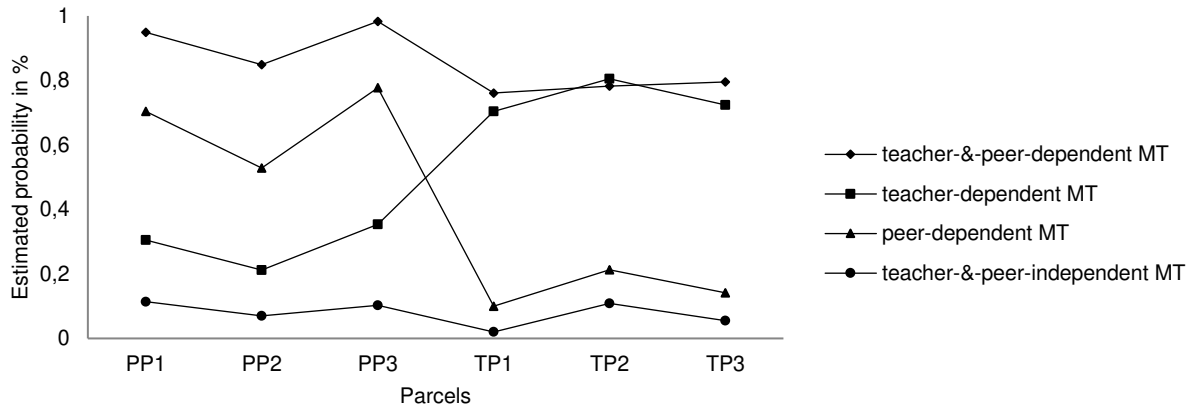
Figure 1. Latent Class Analysis of socio-motivational dependency for the second occasion of measurement. X-axis shows three "peers as motivators" parcels (PP1-PP3) and three "teacher as motivators" parcels (TP1-TP3) included in the model analyses. Y-axis shows probability of agreement with the clusters.

Compared to the class membership from T1 (see Raufelder, Jagenow, Drury, et al., 2013), the teacher-and-peer-dependent MT decreased by 10.1 percentage points (PP), whereas the teacher-dependent MT increased by 10.3 PP. The groups of peer-dependent MT (increase by 0.9 PP) and independent MT (decrease by 0.9 PP) remained relatively stable.

3.3.2 LTA for both occasion of measurement.

Table 2 shows the model fit criteria for the LTA for the two through five class models and the three model restrictions. According to the AIC, BIC and sample-size adjusted BIC (lowest values) the semi-restricted model involving a 4-class solution showed the best fit to our data. Results indicated measurement invariance (equality of conditional probabilities) from T1 to T2. Moreover, a change in class sizes had to be allowed. The classification quality of the model was satisfactory (entropy = .64).

Table 2

Statistical fit results for latent transition models (T1 and T2)

	fully restricted			semi restricted			unrestricted		
Nr. of classes	AIC	BIC	a. BIC	AIC	BIC	a. BIC	AIC	BIC	a. BIC
2	13840.5	13910.6	13866.1	13734.2	13809.2	13761.6	13720.5	13855.6	13769.8
3	13439.2	13549.3	13479.4	13292.7	13422.8	13340.2	13289.7	13509.8	13370.0
4	13242.9	13393.0	13297.7	**13050.3**	**13245.4**	**13121.5**	13051.4	13366.6	13166.4
5	13164.4	13504.6	13288.6	13069.1	13489.4	13222.6	13063.7	13634.0	13272.0

Note: AIC = Akaike Information Criteria, BIC = Bayesian Information Criteria, a. BIC = sample-size adjusted Bayesian Information Criteria. Statistical fit criteria of the superior model are bold.

Table 3 shows latent transition probabilities based on the estimated model. In the following paragraph, the most vital results are described in more detail. The probabilities of staying in the same latent class at T1 and T2 are as follows: .68 for the independent MT, .58 for the peer-dependent MT, and .47 for the teacher-and-peer- dependent and the teacher-dependent MT, respectively. Furthermore, if you were a teacher-dependent MT at T1, the probability of becoming at T2 an independent MT is .40. If you were a teacher-and-peer-dependent MT at T1, the probability of becoming at T2 a peer-dependent MT is .28 and a teacher-dependent MT is .23. All other transition probabilities were below .20.

Table 4 shows an absolute amount of stability and change types from T1 to T2, based on model's estimated posterior probabilities. For example, 7.4% of the sample was a teacher-and-peer-dependent MT at T1 and became peer-dependent MT at T2; 6% of the sample was teacher-and-peer-dependent MT at T1 and became teacher-dependent MT at T2. 3% of the sample that

became teacher-dependent MT at T2 was of peer-dependent MT at T1 and 2.5% of independent

MT at T1.

Table 3

Latent transition probabilities from T1 to T2

	Latent class T2			
Latent class T1	teacher & peer-dependent	peer-dependent	independent	teacher-dependent
teacher & peer-dependent	**0.47**	0.28	0.03	0.23
peer-dependent	0.13	**0.58**	0.21	0.08
independent	0.02	0.19	**0.68**	0.11
teacher-dependent	0.10	0.03	0.40	**0.47**

Note: Probabilities of being in the same class at both occasions of measurement are bold.

Table 4

Transition probabilities

Latent class pattern		% of sample
T1 class	T2 class	
1	1	12.5
1	2	7.4
1	3	0.9
1	4	6.0
2	1	4.6
2	2	21.0
2	3	7.4
2	4	3.0
3	1	0.5
3	2	4.5
3	3	15.8
3	4	2.5
4	1	1.6
4	2	0.4
4	3	5.6
4	4	6.6

Note: 1 = teacher- & peer- dependent; 2 = peer-dependent; 3 = independent; 4 = teacher-dependent. Last row shows the proportion of individuals being in a latent class at T1 and T2.

3.4   Discussion

The purpose of the present study was to identify inter-individual differences and intra-individual changes over time in adolescent students' socio-motivational dependency, following a person-oriented approach. In a first step, LCA was used to investigate inter-individual differences in adolescents' socio-motivational dependency in ninth and tenth graders. In a second

step, latent transition analyses were employed to investigate intra-individual changes in students'

socio-motivational dependency from seventh and eighth grade to ninth and tenth grade.

In accordance with Hypothesis 1a, the same four types of socio-motivational dependency

discovered in grade seven and eight (Raufelder, Jagenow, Drury, et al., 2013) were identified two

years later: (1) a teacher-and-peer-dependent MT, (2) a teacher-dependent MT, (3) a peer-

dependent MT, (4) a teacher-and-peer-independent MT. These findings demonstrate presence of

important inter-individual differences in students' socio-motivational dependency through

adolescence, therefore underlining the validity of the typology itself.

What is important, the proportions of the sample constituting each type changed over time.

However, the number of individuals that remained in the same class (55.9%) was slightly higher

than those who changed. In particular, the number of students who are teacher-dependent

increased, whereas the group of the teacher-and-peer-dependent MT became smaller over time.

In other words, hypothesis 1b that peers become more important agents in during adolescence

was not confirmed. There are different explanations for this result. First, peers are still important

but their influence on students' motivation decreases. Second, the institutional relevance of

teachers become more important in ninth or tenth grade, that is, when students' final examines

are closer. The teacher is critical when it comes to appraisal of achievement. This finding is in

contrasts to those of Goodenow (1993), who found that the importance of the teachers in

influencing motivation decreases through adolescence. Third, the teacher-and-peer-dependent

group is larger than the teacher-dependent group and even a small transition probability from the

former to the latter group might result in a large increase in the teacher-dependent group. Taken

together, the increase in the size of the teacher-dependent MT group suggests an ambivalent role

of the teacher-student relationship in middle adolescence.

Nevertheless, the peer-dependent MT group was the largest in size at time 2, which is consistent with the expectation that peers play an important role during adolescence in one's academic motivation (Brown & Theobald, 1999; Cook, Deng, & Morgano, 2007; Fend, 1998; Savin-Williams & Berndt, 1990). Furthermore, the group of the independent MT did not change in size over time. This finding is important for the aims of the present study, because other research suggested that students of this type seem to have no interest in school (e.g., they show the lowest scores in intrinsic motivation, achievement drive, and performance-approach goals (Jagenow, Raufelder, & Eid, 2014), and, therefore, might be at high risk of leaving school early. However, the results underline the relevance of the typology and the considerations of strong inter-individual differences, as some students show a socio-motivational dependency, while others show constant socio-motivational independence.

The results of LTA demonstrated a substantial amount of transition across all classes except for the independent MT. This finding is in line with Lerner's developmental contextualism (Lerner, 1986, 1991, 1998) and confirms our Hypothesis 2. For those students who were teacher-and-peer-dependent at T1 and became peer-only-dependent at T2, the teachers influence the students' motivation lesson students' motivation. The reason might be that teachers' support declines over the years (Bokhorst, et al., 2010) and that this subgroup of students are sensible for such changes in the teacher-student-relationship. However, almost the same transition probability was found for those becoming teacher-only-dependent from teacher-and-peer-dependent, suggesting that peers also can become less important for one's academic motivation in the tested time period. Similarly, peers also became less influential for some of the peer-dependent MT individuals, who subsequently switched to the independent MT. One explanation is that even though peer groups become increasingly important through adolescence (e.g. Csikszentmihalyi

& Larson, 1984), this might not be the case for academic motivation. More research is needed to investigate the subgroups more closely. For example, in future research the use of covariates might help to explain changes from one group to another. A high transition probability of becoming an independent MT was also found for those individuals who were previously of a teacher-dependent MT. However, this does not mean that the absolute change over time between the two groups is huge. 5.6% of the sample was teacher-dependent at T1 and independent at T2 (see Table 4). The finding of low probability of changing from an independent MT to a teacher-and-peer-dependent MT and vice versa is intuitively correct: A student whose motivation is affected by sources other than peers or teachers is unlikely to be substantially influenced by both approximately two years later.

Investigation of inter-individual and intra-individual developmental differences in motivation typologies might facilitate the creation of programs and teaching activities that would support students within the school system based on their social needs in motivation. The typology created by Raufelder, Jagenow, Dury and colleague (2013) highlights - in line with Lerner's developmental contextualism – important differences in the bidirectional interactions between students and their learning environment (Wigfield & Eccles, 2001). Education curricula and teacher training should take into account these differences in students' motivation styles and how they develop across time. Such an approach would result in a more effective support of each student and accommodating their individual motivation profile. This typology helps to understand the differences in socio-motivational dependency, for example, why and how students interact with their social environment at school in their own specific way and at their own specific pace. In general, in school environments, students are expected to learn and behave

uniformly, and students who do not follow these rigid expectations are typically viewed as maladjusted; while, as our research has shown, they just might have different motivational needs.

Our findings suggest that the motivational types should not be regarded or used as fixed labels because such an approach would inhibit an ability to see one's unique potential in this respect, which might very likely change across time. The discussed typology underlines the fact that individuals tend to be socially motivated in various ways, and that a specific form of socio-motivational dependency exhibited by a student might substantially change over time.

3.4.1 Strengths, limitations, and future directions.

The present study complements the existing findings by further enriching our understanding of intra- and inter-individual changes in adolescents' socio-motivational dependency. First, we investigated how the influence of teachers and peers on students' academic motivation changes across adolescence, because little is known about these relations after grade eight. Second, we studied the nature of this development by using latent transition analysis. This approach enabled us to describe transitions across different motivation types that occur over time.

Despite these strengths, the limitations of the present study should be discussed. The current results are limited in their sole reliance on self-report measures. In future studies, teacher-reports should be used in combination with students' self-reports to provide an additional source of evidence in examining differences in students' academic motivation. Notably, studies that included teacher- and self-reports in research on student motivation have reported low levels of concordance between information provided by these sources (Skinner & Belmont, 1993). Furthermore, the longitudinal results should be interpreted considering variations due to changes in students' motivation over the school year, as the data collection at the first time point was at

the beginning of the German school year, whereas the data collection at the second time point was at the end of the German school year (see Gehlbach, et al., 2012). Moreover, short-time dynamics in peer-relationships that might influence individuals' motivation are not considered in the present study. Further research is necessary to determine personal factors and dispositional motivational characteristics of those individuals. Covariates can be included in LTA models to describe conditions of transition from one to another group.

In conclusion, the current study provided important novel findings regarding students' socio-motivational dependency: Across adolescence, for some students peers seem to have a decreasing influence on academic motivation, whereas for others this influence increases within this time period. A similar pattern characterizes the influence exerted by teachers on student academic motivation: For some individuals, teachers become more important in the time period of interest, while for others they do not. Although the magnitude of transition across different MTs was high, the number of students who are teacher-dependent increased and the number of those teacher-and-peer-dependents decreased over time, suggesting that teachers' influence for students' academic motivation might *de facto* increase across early to middle adolescence, possibly due to their importance for grades obtained in the final exams. Finally, there is an almost stable group of students with socio-motivational independency whose motivational sources should be examined in future studies. Overall, the current findings underline the need of focusing on inter-individual differences in adolescents' motivation, which should be considered in daily school life.

Chapter 4: **Article 3**

A longitudinal analysis of positive and negative peer and teacher effects on

adolescents' motivation

4.1   Introduction

Although there is a large body of research regarding peers' and teachers' effects on adolescent students' motivation (e.g., Deci & Ryan, 2008; Furrer & Skinner, 2003; Goodenow, 1993; Hamre & Pianta, 2001; Harter, 1996; Hughes, 2012; Juvonen & Wentzel, 1996; Ladd, et al., 2009; Reeve, 2006; Wentzel, 1998, 2009b; Wentzel, et al., 2012), it lacks a complex study that examines (a) positive *and* negative effects of (b) *both* teachers and peers together in (c) a *longitudinal* way to consider interindividual differences and intraindividual changes across early to middle adolescence. To bridge this gap, the current study examined whether there are differences in students' perception of peers and teachers affecting students' motivation positively or negatively using a longitudinal design.

4.1.1   Preliminary Research.

Following a person-oriented approach, Raufelder, Jagenow, Drury, and Hoferichter (2013) initially examined whether different types of positive socio-motivational (in-)dependency can be distinguished. Four different motivation types (MT) were confirmed in a sample of German adolescent students (Raufelder, Jagenow, Drury, et al., 2013) as well as in a sample of Canadian adolescent students (Hoferichter, Raufelder, Eid, et al., 2014): (1) teacher-dependent MT, (2) peer-dependent MT, (3) teacher-and-peer-dependent MT, and (4) teacher-and-peer-independent MT. The motivation of students with a teacher-dependency is predominantly affected by the teacher's perceived support, the awareness of the student's abilities or the teacher's own motivation and interest in the subject. In contrast, the motivation of students with a peer-

dependency is predominantly affected by the learning behavior of their classmates, classmates'
motivation or perceived support from their peers. Students with a teacher-and-peer-dependency
are not solely a mixed type from the peer-dependent MT and the teacher-dependent MT, they are
additionally characterized through a strong need of social connectedness in school context in
general (Hoferichter & Raufelder, 2014). Finally, the motivation of students with a teacher-and-
peer-independency is unaffected by teachers' and peers' motivation and support, as well as
unaffected by peers' learning behavior. These students might use other sources of motivation,
independent from peers and teachers.

Based on these findings, Raufelder and colleagues (2013) postulated the concept of socio-
motivational (in-)dependency: Socio-motivational dependency exists when students' academic
motivation is affected by peers' motivation, learning behavior and social support or teachers'
motivation and social support or both (Krunke & Raufelder, 2014; Raufelder, Drury, et al., 2013;
Wentzel, 2009a, 2009b). In contrast, socio-motivational independency exists when the
motivation of individuals is unaffected by others' motivation, learning behavior or perceived
support. In a follow-up study the four types of socio-motivational (in-)dependency could be
confirmed by investigating intraindividual changes from early to middle adolescence (Jagenow,
Raufelder, & Eid, 2016). Although there were slight turnovers between the types, the group of
social-independent students kept almost stable. Overall, the findings underline strong
interindividual differences, which confirm the concept of socio-motivational (in-)dependency.
However, these findings are solely based on positive aspects of peers and teachers as potential
sources of students' motivation. The potential negative influence teachers and peers might have,
has been ignored. Therefore, the current study aims to extent the typology of socio-motivational
(in-)dependency by considering both potential positive and negative influences.

4.1.2   The challenge of social relationships during adolescence.

Adolescence is characterized by dealing not only with developmental changes but also with changes in social structures (McInerney & McInerney, 2006; Wigfield & Eccles, 2001) including the transition from primary to secondary school (Eccles & Midgley, 1990). Additionally, social relationships outside the family take on new meaning and importance (Brown & Theobald, 1999; Cook, et al., 2007; Fend, 1998), but became at the same time increasingly complex (Bukowski, Simard, Dubois, & Lopez, 2011; Dubow, et al., 1991; Larson & Richards, 1991). Therefore, an individual's relationships with his or her peers and teachers can be of a great challenge. Thus, the experience of positive peer relationships can be beneficial (e.g. Dubow, et al., 1991; A. M. Ryan, 2001; Wentzel & Asher, 1995; Wentzel, et al., 2004) whereas poor peer relationships are disadvantageous (Buhs & Ladd, 2001; Buhs, et al., 2006; Coie, 1990; Coie, et al., 1992; DeRosier, et al., 1994; Ollendick, et al., 1992) .

4.1.2.1   Positive and negative peer effects on student's motivation

Results by Geven, Weesei, and van Tubergen (2013) indicate that problematic school behavior such as not paying attention in class is largely influenced by peers. The authors suggest that students' school behavior might be maintained or strengthened by their friends. Particularly the transition from primary to secondary school in seventh grade can be difficult for adolescence in many ways. For example, they must adjust to a new peer group, as well as to coordinate old and new friendships. These can result in negative outcomes of which might be jealousies or feelings of exclusion (Azmitia, et al., 2009). Social withdrawal can have detrimental outcomes in school such as a decrease in achievement motivation, lower self-worth, and poor school performance in general (Buhs, et al., 2006; Coie, et al., 1992; DeRosier, et al., 1994; Ollendick, et al., 1992). Another source that might negatively effects adolescences' school outcomes is peer

pressure. The influence of peer pressure seems to be highest between the eighth and ninth grades (Steinberg, Brown, & Dornbush, 1996). Furthermore, class in secondary school is characterized through increased competition and comparison with peers (Harter, 1996). After the transition from elementary to secondary school students' reference group is widely expanded. Thus, students reassess their competence by comparing with this new social group including, in part, negative effects on the self-esteem at least for some students. However, findings on negative peer effects on school related outcome variables are rather ambiguous or vary substantial over time (Altermatt & Pomerantz, 2003).

In a positive way, peers in class are an important source of emotional support (Azmitia, et al., 2009), understanding, advice and comfort (Harter, 1996; Juvonen & Wentzel, 1996; Kindermann, 1993; Ladd, et al., 2009; Rubin, Bukowski, & Laursen, 2009; Wentzel, 2009a, 2009b; Wentzel, et al., 2010), which in turn affects students' academic motivation and achievement positively (Achermann, Pecorari, Winkler Metzke, & Steinhaus, 2006; Birch & Ladd, 1997; Kindermann & McCollman, 1996; Ladd & Kochenderfer, 1996). Accordingly, research has shown that students who reported good relationships with their peers in school were more likely to display greater emotional engagement at school (Furrer & Skinner, 2003), do generally well in school or have a positive attitude toward school (Crosnoe, et al., 2003). Furthermore, Ladd and colleagues (2009) argued that a positive social climate in class promote students' motivation by increasing student participation, and helpfulness (e.g., providing support and assistance), which increases students' school engagement, as well as the overall levels of learning and academic competence. Moreover, researchers found that changes from third through fifth graders in the received peer support were closely related to changes in their school

adjustment two years later (Dubow, et al., 1991), which underlines the growing influence of peers during early adolescence.

To summarize, peers function not only as important source of motivation directly (Raufelder, Jagenow, Drury, et al., 2013), the quality of peer relationships (Berndt, 1999; Bokhorst, et al., 2010; Cappella, Kim, Neal, & Jackson, 2013; Hymel, et al., 1996; Wentzel, 2009a; Wentzel, et al., 2010) in class are also important indirect factors influencing adolescents' motivation. Another important social relationship in adolescents' motivation processes in school is the teacher-student relationship.

4.1.2.2 *Positive and negative teacher effects on student's motivation*

With the entry in secondary school adolescents start to perceive their teachers as more distant and consequently less friendly, supportive, warm, and caring than teachers in elementary school (Eccles, et al., 1993; Harter, 1996; Hawkins, 1985). That means, exactly during this time of early adolescence, in which students have to deal with many challenges and search for adult emotional support other than parents (Midgley, et al., 1989; Raufelder, 2007; Raufelder, Bukowski, et al., 2013) to successfully deal with these challenges, the quality of the teacher-student relationship decreases from the age of 12 to 18 (e.g., Bokhorst, et al., 2010). In general, the quality of relationships with adults declines in this time period (e.g., Kenny, et al., 2013). However, relationships with teachers are essential as they determine students' academic success (e.g. Baker, 2006; Davidson, et al., 2010; Hughes, 2012; Wentzel, et al., 2010; Zimmer-Gembeck, et al., 2006). Negative teacher-student relationships, in which students perceive their teachers as uncaring or cold, are associated with less intrinsic motivation (R. M. Ryan & Deci, 2000a). In addition, from six to eight grades students perceive their teachers as more evaluative and controlling (Harter, 1996). Controlling teaching behaviors such as giving a lack of choice in

the classroom, assigning boring tasks, and providing low teacher support leads to students'

disengagement and withdrawal, and an undermining of motivation (Roeser & Eccles, 1998;

Skinner & Belmont, 1993).

In contrast, students who perceive their teacher as supportive, warm and caring show higher

motivation (R. M. Ryan & Deci, 2000a) lower levels of anxiety (Hartmut, 1978), and are

generally more interested in school activities (Fraser & Fisher, 1982; Goodenow, 1993; Midgley,

et al., 1989; Skinner & Belmont, 1993). Students tend to be more academically active in the

classroom when they get positive feedback from their teachers (Skinner & Belmont, 1993), when

they believe that their teachers care about them (Roeser, et al., 1996), or when they are well-liked

by their teachers (Wentzel & Asher, 1995). In general positive teacher-student relationships are

associated with higher classroom motivation (Wentzel, 1998), higher academic skills (Baker,

2006), and higher social engagement (Gest, Welsh, & Domitrovich, 2005). Furthermore, teachers

function as role models and provide support different to that of a parent (Midgley, et al., 1989;

Raufelder, 2007) contribute to the classroom climate, and assess a student as a person (Birch &

Ladd, 1997; Jennings & Greenberg, 2009), which in turn can affect students' sense of identity

(Alerby & Hertting, 2007; Jennings & Greenberg, 2009).

4.1.3   Developmental contextualism.

As outlined above, research has shown that for most students, both teachers and peers

have a profound direct (e.g., peers and teachers as motivators) and indirect (e.g., quality of

teacher-student relationship, quality of student-student relationship and social climate in class)

impact on students' motivation and academic achievement. However, for others, changes in the

social school environment, such as shifting peer relationships or the quality of the teacher-

student relationship, are not necessarily associated with detrimental school related outcomes

(Wigfield & Eccles, 2001). For some students their academic motivation is constant as they progress through the school system independent of the teachers who instruct them and the classmates who surround them (Deci & Ryan, 2000a; Harter, 1996). Thus, those students seem to be unaffected by changes in themselves or in the social environment. To sum up, the current state of the literature indicates the presence of different motivation patterns as well as differences in the roles and teachers and peers play in students' academic motivation.

One theory that suggests evidence that there are not solely interindividual differences in adolescents' motivation, but rather intraindividual differences is developmental contextualism (Lerner, 1986, 1991, 1998). Lerner conceptualized the theory of developmental contextualism as a theory of human ontogenetic development that focuses on the changing relations or coactions between the developing individual and his or her context. Particularly, the development of the person-in-context is depicted as a function of dynamic processes embedded in multilevel interactions between a person and his or her contexts. Transferring this theory to adolescents' motivation in the context of school underlines the critical role of teacher and peer influences on the developing student. In other words, students' motivation can be understood as one component of the dynamic interplay between the developing adolescent and his or her school context (i.e., teacher relationships, peer relationships). That means that there are not only interindividual differences between the students, but rather intra-individual differences as the individual undergoes a permanent dynamic process with its context.

Lerner's developmental contextualism as well as the divergent findings from motivation research indicated that students on an inter- *and* intraindividual level differently rely on peers and teachers as source of motivation, which was confirmed through preliminary research outlined above.

4.1.4   Current study.

The current study aimed to extend previous findings by examining whether additional types of socio-motivational (in-)dependency (Raufelder, Jagenow, Drury, et al., 2013) could be identified when considering negative effects from teachers and peers. We investigated (a) positive *and* negative effects of (b) both teachers and peers following (c) a longitudinal research design to consider intraindividual differences and interindividual changes across early to middle adolescence. Moreover, developmental changes in students' socio-motivational (in-)dependency from early to middle adolescence were examined.

Based on the above-mentioned preliminary studies, the empirical findings and Lerner's developmental contextualism, the current study examined the following hypotheses:

Hypothesis 1 – The original four-class structure will not remain when adding negative scales.

Hypothesis 2 – There are specific negative classes that are not covered by the positives.

Hypothesis 3 – The number of students whose motivation is positive or negative influenced by teachers will increase from early to middle adolescence. This assumption is based on preliminary findings by Jagenow, Raufelder and Eid (2016) who suggested that teachers' relevance for students' motivation growth during adolescence. Their findings are based on the same data set and showed an increase in students whose motivation is positive affected by teachers from early to middle adolescence.

4.2   Method

4.2.1   Participants.

Participants at the first occasion of measurement were 1088 seventh and eighth grade students aged 12 to 15 years (mean age = 13.7 years; SD = .53 years; 53.9 % girls) from 23 randomly chosen secondary schools in a suburban, predominantly middle-class community in Brandenburg, Germany. At the second occasion, one and a half year later, 845 students (mean age = 15.32 years, SD = .49 years; 55.0% girls) of the initial sample remained in the study (72.0% retention rate; sex, age, and MT at the first occasion of measurement were no predictors of drop-out.). This age group was examined because students' motivation declines after the transition to secondary school and continues to do so for the first three years of high school (e.g., Harter, 1996), reaching its nadir in the ninth grade (e.g., Eccles & Wigfield, 1998).

Students were informed that participation was voluntary, their answers would be confidential, and that there were no direct benefits associated with participation or costs related to refusing to participate or to answer any of the questions. Prior to data collection, written consent was obtained from participants, participants' parents and the head-teachers. The study was approved by the Brandenburg Department of Education, Youth and Sport. Data on ethnicity was not collected due to low ethnic diversity in Brandenburg. Socio-economic information was not gathered due to laws in Germany prohibiting the collection of such data via a third party.

4.2.2   Procedures and Measures.

In autumn 2011 and one and 1.5 years later self-report measures of students' perception of peers and teachers as positive and negative motivators were collected during class time. Particularly, four subscales from the Relationship and Motivation Scale (REMO; Raufelder, Drury, et al., 2013) were used: (1) 'Teachers as positive motivators' (TPM, 6 items; e.g., "If the

teacher is really interested in the topic, I am interested as well"; internal consistency at the first

time point (T1): Cronbach's α = .78; internal consistency at the second time point (T2):

Cronbach's α = .79), (2) 'Teachers as negative motivators' (TNM, 10 items; e.g., "When I think

the teacher does not believe in me, I don't make an effort to do well."; internal consistency at T1:

Cronbach's α = .82; internal consistency at T2: Cronbach's α = .80), (3) 'Peers as positive

motivators' (PPM, 9 items; e.g., "If my friends want to do better at school, I also want to do

better."; internal consistency at T1: Cronbach's α = .80; internal consistency at T2: Cronbach's α

= .82). (4) 'Peers as negative motivators' (PNM, 6 items; e.g., "If my friends were not interested

in school, I also would not make an effort."; internal consistency at T1: Cronbach's α = .73;

internal consistency at T2: Cronbach's α = .74). These four subscales assess students' perception

of the positive and negative influence teachers and peers have on students' academic motivation,

respectively. The responses are measured on a 4-point rating scale from 1 (*strongly disagree*) to 4

(*strongly agree*).

4.2.3   Statistical Analyses.

4.2.3.1   *Latent Class Analysis (LCA)*

To identify different groups of socio-motivational (in-)dependency at the first and second

occasion of measurement we employed a latent class approach. Latent class analysis (LCA)

(Lazarsfeld & Henry, 1968) is a multivariate method used to identify latent subpopulations of

individuals based on multiple observed measures (Lubke & Muthén, 2005). LCA uses maximum

likelihood estimation for the analysis of categorical outcomes and assumes that the association

between items can be explained by the existence of several latent classes. Within each category,

individuals are assumed to have identical patterns of solution probabilities. Participants can be

assigned to a class for which his or her assignment probability is maximal.

We used the same sample as Raufelder, Jagenow, Dury and colleagues (2013) who investigated only the positive aspects of socio-motivation. However, in the current analysis additional measures that capture negative aspects of socio-motivational (in-)dependency where included. Our analyses are based on the same LCA procedure that led Raufelder, Jagenow, Dury and colleagues to the identification of four different motivation types. Therefore, prior to conducting LCA, we created two parcels from the nine items of the REMO subscale PPM, the six items of the subscale TPM, the six items of PNM, and the nine items from the TNM. There are three reasons that parceling can be advantageous over using the original items (Little, et al., 2002): 1) estimating large numbers of items is likely to result in spurious correlations, 2) subsets of items from a large item pool will likely share specific sources of variance that may not be of primary interest, and 3) solutions from item-level data are less likely to yield stable solutions than solutions from parcels of items. The parcels were also dichotomized as in Raufelder, Jagenow, Dury and colleagues (2013). The authors argued that the 4-point rating scale of REMO is based on a bimodal structure. Moreover, the loss of information by rescaling is not as problematic in a 4-point rating scale as it is, for example, in a 7-point rating scale (Finch & Bronk, 2011).

For analyzing data from the first and second occasion of measurement separately several models, which are differentiated by the number of latent classes, were compared to determine which model fits the observed data best. Using an iterative process, we initially chose a four-class solution and increased the number of classes incrementally until a good fit was achieved. Statistical model fit criteria were employed to determine the optimal number of classes. The statistical criteria used to guide this process was the lowest sample-size adjusted BIC (a.BIC; Schwarz, 1978). Values of the criteria are useful to compare the fit of one model with the fit of

other models. Additionally, the Lo-Mendell-Rubin Adjusted (LMRa) likelihood ration test (McLachlan & Peel, 2000) was conducted to test the statistical significant benefit of a model (p < .05). The LMRa test compares the fit of a model with 'n' latent classes versus that with 'n minus one' latent classes (H0).

4.2.3.2 Latent Transition Analysis (LTA)

Changes and stability of type membership across time was examined using latent transition analyses (LTA), an extension of LCA to multiple measurement occasions. Here, classes of socio-motivational (in-)dependency types are estimated simultaneously at both time points. To determine which model corresponds best to the observed data several models were compared. The models differed in their number of classes and their restrictions: The fully restricted model assumes that: (a) conditional response probabilities and (b) class size are the same for each of the classes across time. In contrast, the unrestricted model makes no assumptions about equality of the measurement parameters across the classes and time. Finally, the semi-restricted model involves an assumption that conditional response probabilities are invariant but allows the class sizes to be estimated freely across time. The statistical criterion used to guide this process was the lowest sample-size adjusted BIC. In Mplus (L. K. Muthén & Muthén, 1999-2012) the two LCA models at the two time points were estimated in parallel but independently of each other.

To account for missing data, models were estimated with full information maximum likelihood (FIML). All of the models in the present study were analyzed using the statistical software Mplus 7 (L. K. Muthén & Muthén, 1999-2012).

4.3 Results

4.3.1 LCA.

Table 1 shows model-fit results from the LCA at both occasion of measurement for the four through eight class models. According to the sample-size adjusted BIC (lowest value) the six-class solution (model 3) had the best fit to our data. Furthermore, for both occasion of measurement the LMRa test indicated that the six-class model fit the data significant better than the five-class model, but the seven-class model was not significant better than the six-class model.

Table 1

Model fit results for LCA at both occasions of measurement

	Statistical Criteria					
	T1			T2		
	a. BIC	Entropy	LMRa LRT	a. BIC	Entropy	LMRa LRT
Model 1: 4 classes	8543.4	0.68	.001	6617.0	0.72	.002
Model 2: 5 classes	8510.8	0.71	.001	6579.6	0.70	.013
Model 3: 6 classes	**8491.2**	0.75	**.012**	**6561.6**	0.77	**.000**
Model 4: 7 classes	8498.2	0.80	.218	6568.3	0.80	.308
Model 5: 8 classes	8511.4	0.78	.214	6580.3	0.83	.127

Note. a.BIC = sample-size adjusted Bayesian Information Criteria, LMRa LRT = Lo-Mendell-Rubin adjusted likelihood ration test.

The classification qualities of the models with six classes were good (entropy = 0.75 and 0.77). Table 2 shows the average estimated assignment probabilities for all individuals that were assigned to a class because of the maximum assignment probabilities of being in a latent class

given the membership in one latent class as compared to all other classes for the first occasion of measurement. The average probabilities in the diagonal can be interpreted in terms of reliability measures of the correct class assignment.

Table 2

Average latent class probabilities for the first occasion of measurement.

	Classes					
	1	2	3	4	5	6
1	0.884	0.000	0.015	0.073	0.027	0.001
2	0.000	0.876	0.061	0.045	0.000	0.018
3	0.002	0.029	0.864	0.008	0.039	0.058
4	0.034	0.026	0.009	0.851	0.028	0.051
5	0.041	0.000	0.056	0.055	0.770	0.078
6	0.000	0.017	0.075	0.048	0.063	0.797

Note. Average probabilities for most likely latent class membership (row) by the true latent class (column).

4.3.2 LTA.

Table 3 shows the model fit criteria from the LTA for the three model restrictions of the four through eight class models at both occasion of measurement. According to the sample-size adjusted BIC (lowest values) the semi-restricted model with six classes showed the best fit to our data. Results indicated measurement invariance (equality of conditional probabilities) from T1 to T2. Moreover, a change in class sizes is indicated. The classification quality of the model was satisfactory (entropy = .67).

Table 3

Model fit results for LTA

Nr. of classes	fully restricted		semi restricted		unrestricted	
	a. BIC	Entropy	a. BIC	Entropy	a. BIC	Entropy
4	15106.3	0.657	14951.8	0.652	15022.5	0.677
5	15013.4	0.627	14850.5	0.662	14925.9	0.684
6	14950.6	0.666	**14778.2**	0.665	14882.3	0.687
7	14946.7	0.698	14788.7	0.667	14907.3	0.697
8	14954.2	0.729	14817.2	0.689	14956.1	0.712

Note. BIC = sample-size adjusted Bayesian Information Criteria

Figure 1 shows the estimated conditional class-specific probabilities to agree with the content of the items for the first occasion of measurement. Our data revealed peers not having negative effects on students' motivation since none of the classes show high values on the indicator variable PNM. The first group (T1 10.2%, T2 14.0%) consists of students whose motivation is positively and negatively affected by teachers and positively by peers with high values on all indicator variables except PNM. The second group (T1 14.8%, T2 13.8%) consists of students whose motivation is positively affected by peers only. The third group (T1 12.6%, T2 14.5%) consists of students whose motivation is not positively affected by teachers or peers, but it is indifferent whether teachers have negative effects on students' motivation or not. The largest group (T1 28.5%, T2 32.8%) consists of students whose motivation is independent of teachers and peers with low values on all indicator variables. The fifth group (T1 10.2%, T2 14.0%) consists of students whose motivation is positively influenced by teachers, but it is indifferent

whether teachers have negative effects or not. The last group (T1 21.7%, T2 13.5%) consists of

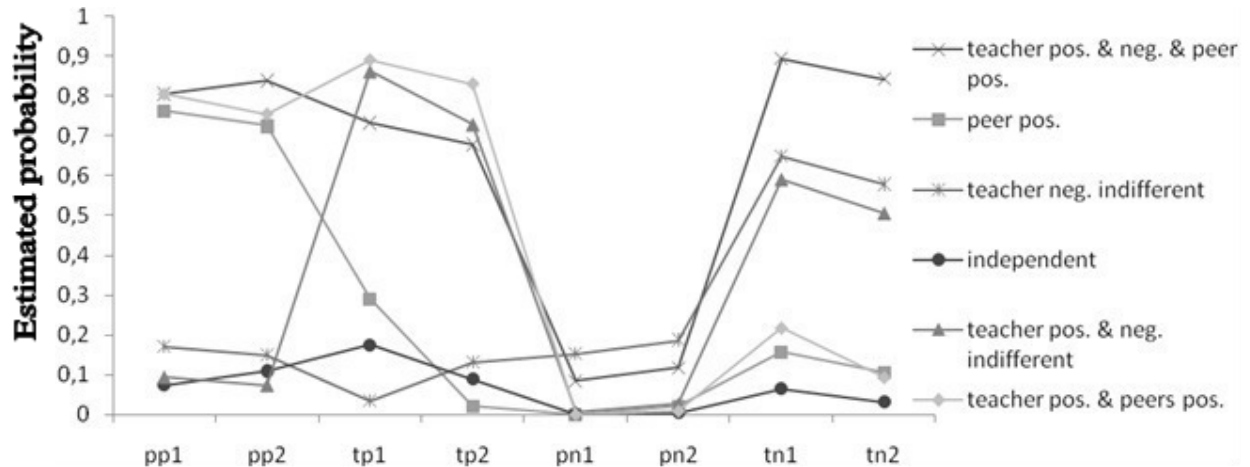students who are positive motivated both, by teachers and peers.

Figure 1. Estimated conditional class-specific probabilities to agree to the content of the items for the first occasion

of measurement. X-axis shows two peers as positive motivator parcels, two teachers as positive motivator parcels,

two peers as negative motivator parcels, and two teacher as negative motivator parcels included in the analyses (pp1

= peers as positive motivator parcel 1, pp2 = peers as positive motivator parcel 2, tp1 = teachers as positive

motivator parcel 1, tp2 = teachers as positive motivator parcel 2, pn1 = peers as negative motivator parcel 1, pn2 =

peers as negative motivator parcel 2, tn1 = teachers as negative motivator parcel 1, tn2 = teachers negative motivator

parcel 2). Y-axes shows probability of agreement with the clusters.

Table 4 shows latent transition probabilities based on the estimated model. In the following,

the most vital results are described in more detail. The probabilities of staying in the same latent

class on the first and second occasion of measurement can be seen in the diagonal and vary

between .66 (independent) and .43 (teachers and peers having positive effects on students'

motivation). Beside these *stayers* the highest probabilities for moving from one to another class

are from the teacher positive and negative-indifferent class (class 5) to the independent class

(.25) and from the teacher and peer positive class (class 6) to the independent class (.24).

However, data revealed that for some students it is very unlikely to transit from one class to another. For example, the likelihood for moving from class 3 (indifferent whether teachers have negative effects on students' motivation or not) to class 1 (positive and negative teacher and positive peer effects) is zero.

Table 4

Latent transition probabilities

Latent class T1	Latent class T2					
	1	2	3	4	5	6
1	**0.445**	0.110	0.134	0.059	0.153	0.099
2	0.073	**0.472**	0.094	0.193	0.000	0.167
3	0.000	0.120	**0.567**	0.211	0.102	0.000
4	0.048	0.090	0.097	**0.662**	0.102	0.000
5	0.112	0.000	0.148	0.249	**0.441**	0.050
6	0.112	0.062	0.000	0.238	0.159	**0.428**

Note. Probabilities of being in the same class at both occasions of measurement are bold. 1 = positive and negative teacher-dependent and positive peer-dependent motivation type (MT), 2 = positive peer-dependent MT, 3 = negative teacher-dependent MT, 4 = independent MT, 5 = positive and negative teacher-dependent MT, 6 = positive teacher-and-peer-dependent MT.

4.4 Discussion

The purpose of the current study was to investigate students' perceptions of teachers and peers as a potential source as positive and negative motivators considering interindividual differences and intraindividual changes during early and middle adolescence. We aimed at extending the four class model of socio-motivational (in-)dependency from Raufelder, Jagenow, and colleagues (2013) by negative influences peers and teachers might have on academic motivation. In a first step, LCA was used to investigate the statistically best number of latent classes of socio-motivational (in-)dependency. In a second step, LTA was conducted to examine intraindividual changes in students' socio-motivational (in-)dependency over time.

The data suggest interindividual differences on how adolescent students perceive their teachers and peers as a potential source of motivation in the school context. For some students teachers and peers function not only as positive motivators but their teachers also can have negative perceived effects on academic motivation. That is, those teachers and peers who show high motivation or are supportive can enhance students' engagement in class while teachers who are not supportive or not motivated or show no interest in their subject can diminish students' motivation. However, two groups can be distinguished for whom the role of unsupportive teachers is indifferent: For one group teachers and peers have no positive effects on students' motivation but somehow negative. For the other group some teachers could influence students' motivation in a positive way and others somehow in a negative way. Furthermore, compared to analyzes with positive scales only (Raufelder, Jagenow, Drury, et al., 2013) no group of students is only positively affected by teachers. In contrast, one group is only negatively affected by teachers. Additionally, the teacher-and-student dependent motivation type identified by

Raufelder, Jagenow and colleagues divided into two types, of which one type is not only positively affected by teachers and peers but also negatively affected by teachers.

Moreover, our data revealed that students do not perceive their peers as a negative source of motivation, whereas some students perceive their peers as positive motivators. This finding might be explained by findings that students tend to associate with peers who share similar achievement and motivational characteristics (Altermatt & Pomerantz, 2003; A. M. Ryan, 2001; Schwartz, 1981). High-achieving students would pick favor classmates who encourage them to get good grades and not to misbehave in class whereas low-achieving students would favor classmates who do not value academic goals (Berndt & Keefe, 1996). However, students higher in academic achievement are usually more popular with peers (Coie, 1990; Juvonen & Murdock, 1993) and hence might be more discernible as source of motivation. One process that leads students to behave similar as their classmates is that of social comparison (Guay, Boivin, & Hodges, 1999; Rogers, Smith, & Coleman, 1978; Verhoff, 1969). Social comparison enhance students to prove if they are as good as, or better than, their classmates which might lead to competitions and increases students' motivation to achieve (Berndt & Keefe, 1996). Additionally, students who value academic goals but belong to a peer group where positive studying behavior is not valued are likely to show positive academic behavior than negative academic behavior (Masland & Lease, 2013). Even for students with behavioral difficulties strong peer relationships in the classroom can have positive effects on school engagement (Cappella, et al., 2013). Another explanation could be that peers who have clear influential effect on one's motivation are usually friends (e.g. Geven, et al., 2013) and young people would not admit that their friends have negative effects on their own motivation.

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The largest group our analyses could identify consist of students who seemed to be unaffected by teachers and peers in terms of academic motivation. This independent motivation type needs further investigation in future studies since this type showed low levels of motivation when positive teacher and peers effects are considered (Jagenow, et al., 2014) The authors suggested that the independent MT is little affected emotionally by achievement situation and thus not susceptible by teachers and peers influence.

More research is needed to identify potential variables to predictor transition among the different motivation types across time. For example, achievement drive, learning goals, intrinsic motivation, and social relationships at school could be included in further studies to predict latent transition probabilities.

To summarize, our first two hypotheses have been confirmed in that latent class analyses revealed six different types of socio-motivational (in-)dependency instead of four: (1) positive and negative teacher-dependent and positive peer-dependent MT (2) positive peer-dependent MT, (3) negative teacher-dependent MT, (4) independent MT, (5) positive and negative teacher-dependent MT, (6) positive teacher-and-peer-dependent MT.

Concerning changes over time, the group of students whose motivation is positively affected both, by teachers and peers, showed the largest decrease in number. According to hypotheses 3 we found an increase in the group where teachers have positive effects and the group where teachers have positive and negative effects. These findings suggest that teachers' influence on students' motivation increases from early to middle adolescence. However, the largest increase was found in the group of the independent type.

The largest probabilities of transition to the independent MT can be observed from the group of students whose motivation is positively influenced by teachers and peers, the group of

students whose motivation is influenced by teachers positively and somehow negatively, and the group of students who are somehow negatively influenced by teachers only. For those students, social others at school seem to have no longer effects on their own academic motivation with increasing age. As students' progress through the school system the school environment becomes more formal and impersonal (Ecceles, Midgley, & Adler, 1984) and thus they might focus more on themselves. However, more research is needed to investigate whether this type is motivated by others than teachers or peers for example extrinsic goals or individuals outside from school.

Furthermore, it is unlikely to be influenced by teachers only when one has been influenced by peers only before and vice versa. Moreover, it is unlikely to become positively influenced when one is in a group where one has been negatively influenced before. Finally, the largest probabilities our transition analyses revealed are the probabilities of stayers, those students who are in the same class at the first and second occasion of measurement. The most stable group is the independent motivation type. Students whose motivation is not influenced by teachers or peers will remain mostly still uninfluenced by those agents in their motivation.

4.4.1 Strengths, limitations, and future directions.

The design of the current study has several important strengths that have substantially contributed to the understanding of the association between social relationships and academic motivation. First, we investigated both teachers' and peers' effects on academic motivation, whereas most studies focused either on teachers or peers. Second, we investigated both positive and negative effects teachers and peers can have on students' academic motivation. Third, we used a longitudinal design to test for changes in the students' perception of teachers and peers as motivators from early to middle adolescence. Finally, we followed a person-oriented approach to identify subgroups in the population that are characterized by a particular pattern of co-occurring

traits. The LCA revealed six types of socio-motivational (in-)dependency, which enable us to extend previous findings (Raufelder, Jagenow, Drury, et al., 2013). The results from the LTA highlighted that adolescent students differ not only in what motivates them, but also show changes in relation to the sources of their motivation over time.

Nevertheless, multiple limitations of the current study must be addressed. First, information about the socio-economic status of participants' parents was not available due to German legal restrictions. Second, the findings are limited due to their sole reliance on self-report measures. However, we chose this method of data collection because we were interested in students' subjective perception of teachers and peers as a potential source of motivation. Research that has included different sources of information such as self-reports and teacher-reports of motivation showed low levels of concordance between information by the different informants (Skinner & Belmont, 1993). Notably, the extent to which the current results are generalizable is an important question because to our knowledge there are no studies investigating positive and negative effects of teachers and peers on students' motivation over time. Therefore, future studies testing different samples should attempt to replicate the present findings. However, the concept of socio-motivational (in-)dependency was already empirically replicated in a sample of Canadian adolescents (Hoferichter, Raufelder, Eid, et al., 2014). Furthermore, more motivation types might be identified in a larger sample.

Overall, the current study emphasizes the importance of further research on negative effects especially in respect to the teacher-student relationship. Future studies could employ qualitative methods, such as interviews or class observation, which might facilitate the identification of additional characteristics unique to each type of described socio-motivational (in-)dependency, thus further advancing our understanding of academic motivation. Finally, an individuated

approach to supporting academic motivation would be further supported by research on interindividual personality differences that might drive the existence of different subtypes within each motivation type.

4.4.2 Conclusion.

The present study has extended the existing research on peers' and teachers' effects on adolescents' academic motivation by considering interindividual differences and intraindividual changes from early to middle adolescence. Specifically, our findings revealed important differences in students' perceptions of teachers and peers as potential sources of motivation in school environments. These results emphasize that head teachers, school psychologists, and teachers need to consider that social relationships at school are important for academic motivation, but for some students more than for others. Adolescent learning can be facilitated if multiple learning and teaching styles are employed in classrooms, which are based on understanding the different motivation types exhibited by such students.

Chapter 5: **General Discussion and Conclusions**

5.1 Review of the main findings

The present dissertation contributes to current research on social relationships and academic motivation by filling an important gap in our understanding of interindividual differences and intraindividual changes in the effect of teacher-student and student-student relationships on adolescents' academic motivation. A person-oriented approach, where subgroups of a population characterized by a particular pattern on a set of variables was used to further investigate specific characteristics of different socio-motivational (in-)dependency types introduced by Raufelder, Jagenow, Dury and colleagues (2013). I demonstrated that the types not only differ in their amount of academic motivation but also that students' perceptions of teachers and peers as potential sources of motivation change at least for some students over time. In addition, I have shown that the pattern of the typology changes when considering not only the positive but also the negative effects teachers might have on students' motivation.

In the first article, the quality of social relationships, academic achievement, and motivational aspects within the classroom environment were assessed as predictors of socio-motivational (in-)dependency in order to provide a more in-depth picture of the interindividual differences between the different types of socio-motivational (in-)dependency. Due to the fact that my analyses are based on the LC analyses that led Raufelder, Jagenow, Dury and colleagues (2013) to identify four types of socio-motivational (in-)dependency, I used the same data and extended the existing model by including explanatory variables to predict the four classes. Therefore, a three-step approach developed by Vermunt (2010) was used to introduce predictor variables while keeping the measurement model fixed and taking the misclassification errors in the LCs into account.

With respect to the entire set of covariates including intrinsic motivation, achievement drive, learning goals, mathematics grades, activating and inhibitory test anxiety and the teacher-student relationship, all are substantial predictors for students' assignment to the four types of socio-motivational (in-)dependency. Compared to all other types, students of the teacher-and-peer-dependent motivation type show the highest intrinsic motivation. Moreover, this type shows higher values in learning goals than the peer-dependent and teacher-and-peer-independent motivation type. Furthermore, the teacher-and-peer-dependent motivation type show higher scores on achievement drive than the teacher-and-peer-independent motivation type. However, the teacher-and-peer-dependent motivation type show poorer grades than the teacher-and-student-independent motivation type and the peer-dependent motivation type. Contrary to what was expected, the quality of social relationships between peers was not a significant predictor of socio-motivational (in-)dependency. However, the teacher-and-peer-dependent MT reported higher teacher-student relationship quality compared to the independent MT. Although, none of the variables assessed in the study discriminated between the teacher-dependent and the peer-dependent MT.

In the second article, I investigated interindividual differences and intraindividual changes over time in adolescent students' socio-motivational (in-)dependency. Therefore, I tested whether the four types of socio-motivational (in-)dependency found in seventh and eighth graders can be identified within the same cohort approximately two years later. Moreover, I investigated to what extent individuals vary in their socio-motivational (in-)dependency from early to middle adolescence. To investigate individuals' transition between latent classes over time, I employed latent transition analyses, which combines latent class analyses with

autoregressive modeling (specifically Markov models; Langeheine & Van de Pol, 1990), where the latter describes transitions among the classes with time passing.

For the second occasion of measurement, the same classes as in Raufelder, Jagenow, Dury and colleagues (2013) could be identified. Meaning that ninth and tenth grade students can be grouped in teacher-and-peer-dependent MT, teacher-dependent MT, peer-dependent MT and teacher-and-peer-independent MT. Only the number of students changed at least for two classes over time. Compared to the class membership from the first occasion of measurement, the number of students who are teacher-and-peer-dependent MT decreased whereas the teacher-dependent MT increased. The groups of peer-dependent MT and independent MT remained relatively stable. However, substantial transitions between the classes could be identified even though the probabilities of staying in the same latent class from the first occasion to the second occasion of measurement were higher. The largest amount of transition was observed from the teacher-dependent MT and the peer-dependent MT to the teacher-and-peer-independent MT and from the teacher-and-peer-dependent MT to the peer-dependent type. However, very little transition could be observed from the teacher-and-peer-dependent MT to the independent MT and vice versa, and from the teacher-dependent MT to the peer-dependent MT and vice versa.

In the third article, I investigated students' perceptions of teachers and peers as a potential source as positive *and* negative motivators considering interindividual differences and intraindividual changes during early and middle adolescence. Therefore, in my analyses additional measures that capture negative aspects of socio-motivational (in-)dependency where included. I tested whether the four groups could be extended by additional motivation types that where not covered when considering positive teacher and peer effects on students' motivation by only employing latent class and latent transition analyses.

Data revealed that students perceive peers as not having negative effects on their motivation. Findings of negative peer effects on school related outcome variables are rather ambiguous or vary substantial over time (Altermatt & Pomerantz, 2003). In addition, six different groups could be identified in seventh and eighth graders as well in ninth and tenth graders. The largest group consists of students whose motivation is independent of teachers and peers. The second group consists of students whose motivation is positively affected by peers only. The third group consists of students who are positively motivated by both teachers and peers. The fourth group consists of students whose motivation is positively and negatively affected by teachers and positively by peers. The fifth group consists of students whose motivation is positively influenced by teachers, but the group is indifferent as to whether teachers have negative effects or not. The sixth group consists of students whose motivation is not positively affected by teachers or peers, but it is also indifferent as to whether teachers have negative effects on students' motivation or not.

Considering latent transition analyses, the probabilities of staying in the same latent class on the first and second occasion of measurement are the largest. Beside these *stayers,* the probabilities for moving from one to another class from the first to the second occasion of measurement are the highest for the teacher positive and negative-indifferent MT to the independent MT and from the teacher and peer positive MT to the independent MT. However, data revealed that for some students it is very unlikely to transit from one class to another. For example, the likelihood of moving from the MT where it is indifferent as to whether teachers have negative effects on students' motivation or not to the MT with positive and negative teacher and positive peer effects is zero.

5.2   Strengths and Limitations

The design of my dissertation has a number of important strengths that have substantially contributed to the understanding of the association between social relationships and academic motivation. First, I investigated both the teacher-student and the student-student relationships and their association to academic motivation, whereas most studies have focused either on teachers or peers. Second, a longitudinal design to consider interindividual differences and intraindividual changes across early to middle adolescence was used. For a large group of students, their perception of teachers and peers as a potential source of motivation change during adolescence. I investigated how the influence of teachers and peers on students' academic motivation changes across adolescence because little is known about these relations after grade eight. By investigating the nature of this development, descriptions of transitions across different motivation types that occur over time could be provided. Third, I investigated both positive and negative effects teachers and peers can have on students' academic motivation. The original typology could be extended and differences between students could be described more precisely. Finally, the different types of students were tested on various constructs of motivation. More precisely, the employment of self-determination, achievement motivation, and achievement goal orientation scales that measured in total eight different variables provided a comprehensive view of interindividual differences between the four motivation types.

Nevertheless, multiple limitations of the current study have to be addressed. First, information about the socio-economic status of participants' parents was not available due to German legal restrictions. For practice implications, it could be of great interest if the motivation types can be distinguished according to their socio-economic status. Second, the data is cross-sectional, thus care is warranted when attempting to infer the causal relationship between

different variables investigated in this study. Third, the findings are limited due to their sole reliance on self-report measures. However, I chose this method of data collection because I was interested in students' subjective perception of teachers and peers as a potential source of motivation. However, research that has included self-reports and teacher-reports of motivation have demonstrated low levels of concordance between information by the different informants (Skinner & Belmont, 1993). Fourth, the hypotheses were tested on only one sample consisting of 12- to 15-year-old adolescents and 14- to 17-year-old adolescents respectively and thus the generalizability of our findings to other age groups needs to be examined through future research.

5.3   Theoretical and Practical Implications

Beside these limitations, results of this dissertation have some theoretical and practical implications. The findings discussed above extend our understanding of the link between social relationships and academic motivation in adolescence in several ways. First, they support the existence of interindividual differences in the perception of peers and teachers as a potential source of motivation at school. Second, they demonstrated differences in multiple aspects of academic motivation between the investigated types of socio-motivational (in-)dependency. The findings of the first article show that students do not only differ in their assignment to the different motivation types but also differ in school relevant variables such as academic motivation and social relationships with teachers.

These results have some implications for existing findings. For example, Urdan and Schoenfelder (2006) proposed that students can be motivated to participate in academic tasks by providing them with the opportunity to fulfill social needs, e.g., by allowing them to work with friends. The current results suggest that this might not be true for all students. For instance, the

motivation of the teacher-dependent MT student might not benefit from group-work tasks because their motivation is unaffected by their relationships with peers. However, there might also be other mechanisms which increase or improve the motivation in team work. For example, the experience in the team to be competent or the competition with others. In addition, it might be argued that a teacher can enhance students' academic motivation by altering his or her motivation or interest in the subject. Such a change might not affect peer-dependent or teacher-and-peer-independent MTs students because they are unaffected by teacher support.

The results from the first article suggest that students of the teacher-and-peer-dependent MT benefit the most from the current school system because its motivation is higher than those of all others MTs. These findings are in line with findings from Raufelder, Regner and colleagues (2016) who find highest level of school engagement in the teacher-and-peer-dependent MT. Moreover, its intrinsic motivation is highest compared to all other types, supporting the finding that the psychological needs for autonomy, competence and relatedness are best satisfied in this type (Raufelder, Regner, et al., 2016). Perhaps such students score higher on academic motivation because their motivational dependency is better suited to the school context, e.g., frontal teaching style and group work. Nonetheless, the motivation of a peer dependent MT might be fostered by working together with a peer who is already highly motivated. The differences of the four MTs, across achievement motivation, achievement goal orientation and self-regulation, suggest that in educational contexts academic motivation should always be examined in combination with social relationships in future investigation.

The finding that the independent MT show better grades in mathematics than the teacher-and-peer-dependent MT even though the former display less academic motivation is somehow surprising. People with a high level of motivation tend to invest more effort in tasks to increase

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their performance in the long run and have been related positively to academic achievement (e.g., Wentzel, 1993, 2000) and therefore got better grades (e.g. Dweck & Leggett, 1988). One explanation might be that the independent MT experiences less inhibitory test anxiety and, therefore, achieves better in mathematics even though the general motivation is not the highest. The peer-dependent, the teacher-dependent and the teacher-and-peer-dependent MT might be afraid of being judged in test situations because teachers and peers seem to be important agents in their daily school life. The independent type might be less affected emotionally by achievement situations in the class environment in general. However, this does not explain why the peer-dependent MT has better mathematics grades than the teacher-and-peer-dependent MT, particularly because this type did not differ in the level of inhibitory test anxiety compared to the teacher-and-peer-dependent MT. More research is needed on the impact of social relationships on socio-motivational (in-)dependency. For example, using more suitable scales that capture the quality of individual student-student relationship quality.

Another finding which needs further investigation is in regard to how the peer-dependent MT do not differ from the teacher-dependent MT in intrinsic motivation. However, the psychological needs for competence, relatedness and autonomy are better satisfied for the peer-dependent MT than for the teacher-dependent MT (Raufelder, Regner, et al., 2016). Therefore, the peer-dependent MT experience a higher degree of self-determination and should show a higher level of intrinsic motivation (R. M. Ryan & Deci, 2000b) than the teacher-dependent MT.

Adolescence development is characterized by changes in social structures (McInerney & McInerney, 2006; Wigfield & Eccles, 2001). For example, social relationships outside the family take on new meaning and importance (Brown & Theobald, 1999; Cook, et al., 2007; Fend, 1998), and at the same time become increasingly complex (Bukowski, et al., 2011; Dubow, et al.,

1991; Larson & Richards, 1991). Thus, an adolescence' s relationships with his or her peers and teachers can be a great challenge. Presented results demonstrate important interindividual differences in students' socio-motivational (in-)dependency through adolescence. For slightly more than the half of the students, this socio-motivational (in-)dependency does not change from early to middle adolescence. However, for the other part of students, this socio-motivational (in-)dependency changes with time. It would be of interest to find out what cause these changes. In future studies, explanatory variables could be integrated into latent transition analyses in order to predict individual latent transition probabilities. For example, changes in the quality of social relationships with students or teachers could cause changes in students' perceptions of what motivates them.

The socio-motivational independent students constitute the largest group of MTs in my analyses and was the type that increased most. Thus, further studies could concentrate on this type and investigate what makes it unaffected by teacher and peer influence. Maybe its motivation comes from other sources outside of school. Other than expected, this type does not demonstrate the highest intrinsic motivation. That and the finding that the teacher-and-peer-dependent MT shows the highest intrinsic motivation suggest that socio-motivational dependency cannot be understood as extrinsic motivation. Meaning, when one's motivation is affected by teacher or peer characteristics, this influence is not experienced as externally regulated.

The results from the second and third article revealed that teachers' influence on students' motivation increases from early to middle adolescence. This finding is in contrast to those of Goodenow (1993), who found that the importance of teachers in influencing motivation decreases through adolescence. An explanation for the findings of the articles is that when

students' final exams are closer, the institutional relevance of teachers becomes more important as in ninth or tenth grade, while from grade six to eight, students perceive their teachers as more evaluative (Harter, 1996). The teacher is critical when it comes to appraisal of achievement and therefore, more students experience their teachers as influencing their academic motivation as they progress through adolescence.

In addition, article three demonstrates that not only positive effects of teachers should be considered when investigating the link between social relationships and motivation. Concerning the group sizes, in the second article the largest group consists of students whose motivation is positively affected by peers. In the third article the largest group consists of students whose motivation is independent of teachers and peers. When considering only positive aspects of socio-motivational (in-)dependency and neglect negative aspects waver students might indicate to be a peer-dependent type. Asking for negative aspects seems feasible and provides an alternative for those students. Moreover, with respect to analyses with positive scales only (Raufelder, Jagenow, Drury, et al., 2013), the analyses with positive and negative scales revealed that no group of students is only positively affected by teachers. In contrast, one group is only negatively affected by teachers. These results emphasize that head teachers, school psychologists, and teachers need to consider that the role of teachers is more important for some students' motivation than for others, especially when academic motivation is low.

Finally, comparative studies to evaluate educational systems should look not only at academic achievement but also at social variables. For example, the Programme for International Student Assessment (PISA) investigates social competence. However, team working competence might not be a sufficient predictor for school outcome for all students as mentioned above. A high team-working competence might be good for students whose motivation is affected by peers

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but might not be good for those whose motivation is unaffected by peers. In further studies, the relationship between team working competence and socio-motivational (in-)dependency could be investigated.

5.4   General Conclusions

The data from this dissertation supports the suggestion of Greene, Miller, Crowson, Duke, and Akey (2004) that teachers should consider different aspects of the classroom to effectively encourage adaptive motivation in students. Knowledge of a student's socio-motivational (in-) dependency would provide teachers with additional means to try to increase academic motivation, e.g., some students might be unaffected by teachers' attempts to enhance the quality of a teacher-student relationship. Thus, findings emphasize that it is important for teachers to explore different alternatives when trying to motivate different types of students. The general approach towards curricula and daily teaching activities, assuming that students' motivation can be strengthened by well-functioning social relationships, should be replaced by a more individuated approach, where different teaching styles might support different MTs.

There is a great consensus that teacher-student and student-student relationships are closely related to students' academic motivation, however, so far, it is not well understood how and why this link differs between students. This dissertation provides a little insight into these questions by revealing interindividual differences and intraindividual changes in students' perceptions of teachers and peers as potential sources of motivation in school environments. It expands the understanding of the typology of socio-motivational (in-)dependency and highlights characteristics of the various types.

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Appendix

Zusammenfassung

Die Schule ist ein Ort, an dem Kinder und Jugendliche einen großen Teil ihrer Zeit verbringen. Es ist nicht nur ein Ort, an dem sie lernen, sondern auch ein Ort sozio-emotionaler Entwicklung. Diese sozio-emotionale Entwicklung wird sowohl durch soziale Interkationen als auch organisatorische Prozesse beeinflusst. Jüngere Forschungen haben gezeigt, dass Lehrer und Peers ganz unterschiedliche Rollen für die Motivation von Schülern einnehmen. Für einige Schüler ist der Lehrer ein wichtiger Motivator, wenn es um schulische Leistungen geht, für andere Schüler sind es die Peers. Darüber hinaus gibt es auch Schüler, deren Motivation sowohl von Lehrern als auch von Peers beeinflusst wird. Schließlich gibt es Schüler, deren Motivation scheint unabhängig von Lehrern und Peers ist. Basierend auf diesen Befunden wurde eine Typologie entwickelt, die vier verschiedene Typen von sozio-motivatonaler (Un-)Abhängigkeit unterscheidet.

Der lehrer-abhängige Typ kann charakterisiert werden als ein Schüler, dessen schulische Motivation positiv beeinflusst wird vom Unterrichtsstil, von der Überzeugung, dass der Lehrer Interesse an seinem Fach hat und sich für sein Fach begeistert. Die Motivation des lehrer-abhängigen Typs ist unabhängig von Eigenschaften der Peers. Im Gegensatz dazu kann der peer-abhängige Typ charakterisiert werden als ein Schüler, dessen Motivation positiv beeinflusst wird von der wahrgenommenen Motivation der Peers, deren Lernfortschritte und deren schulischen Engagements. Die Motivation dieses Typs ist unabhängig von Eigenschaften des Lehrers. Der lehrer-und-peer-abhängige Typ ist ein Schüler, dessen Motivation sowohl von Eigenschaften der Lehrer, als auch von Eigenschaften der Peers abhängig ist und kann als ein Mischtyp gesehen werden. Im Kontrast dazu ist der lehrer-und-peer-unabhängige Typ ein Schüler, dessen

Motivation weder von Eigenschaften der Lehrer noch von Eigenschaften der Peers beeinflusst wird.

Das Ziel dieser Dissertation ist es, ein besseres Verständnis der Typologie und der sozio-motivatonalen (Un-)Abhängigkeit während der frühen und mittleren Adoleszenz zu geben. Dabei wird erforscht, wie sich die Wahrnehmung von Schülern in Bezug auf Lehre und Peers als Motivatoren unterscheiden und verändern. Der Fragen, der im ersten Artikel nachgegangen wird ist: Können die vier Typen in Bezug auf Motivation, soziale Beziehungen und schulischen Leistungen unterschieden werden?

Um diese Frage zu beantworten, wurde ein bestehendes Model einer latenten Klassenanalyse aus einer vorrangegangenen Studie erweitert. (Raufelder, Jagenow, Drury, & Hoferichter, 2013). Dabei wurde dem Modell acht schulbezogene Variablen zugefügt und eine latente Klassenanalyse mit Kovariaten durchgeführt. Von den verwendeten Kovariaten erwiesen sich intrinsische Motivation, Leistungsstreben, Lernziele, aktivierende und hemmende Prüfungsangst, die Mathematiknote und die Lehrer-Schüler-Beziehung als geeignete Prädiktoren um die Typenzugehörigkeit vorherzusagen. Im Vergleich zu allen anderen Typen zeigt der lehrer-und-peer-abhängige Typ die höchste intrinsische Motivation. Dieser Typ weist auch eine höhere Lernzielorientierung als peer-abhängige und der lehrer-und-peer-unabhängige Typ und ein höheres Leistungsstreben als der lehrer-und-peer-unabhängige Typ auf. Im Kontrast zu diesen Befunden hat der lehrer-und-peer-abhängige Typ schlechtere Mathematiknoten als der peer-abhängige und der lehrer-und-peer-unabhängige Typ. Dieses Ergebnis ist insofern überraschend, da höhere Motivation in der Regel mit höheren schulischen Leistungen einher geht.

Im zweiten Artikel untersuche ich die interindividuellen Unterschiede und die intraindividuellen Veränderungen der sozio-motivationalen (Un-)Abhängigkeit. Hierfür wurden

die selben Schüler wie aus der ersten Studie eineinhalb Jahre später, in der neunten und zehnten Klasse, ein zweites Mal bezüglich ihrer Wahrnehmung von Lehrern und Peers als Motivatoren befragt. Für die Auswertung der Daten wurde eine latente Veränderungsanalyse durchgeführt. Zum zweiten Messzeitpunkt konnten ebenfalls vier Typen der sozio-motivationalen (Un-) Abhängigkeit identifiziert werden, die sich inhaltlich nicht von der Typologie des ersten Messzeitpunktes unterscheiden. Eine Veränderung der Größe der Gruppen konnte jedoch festgestellt werden. Verglichen mit der Gruppengröße zum ersten Messzeitpunkt nimmt die Größe der lehrer-und-peer-abhängigen Typen ab und die Gruppe der lehrer-abhängigen Typen zu. Die Gruppen der peer-abhängigen und der lehrer-und-peer-unabhängigen Typen blieben annähernd gleich groß.

Im dritten Artikel möchte ich bisherige Befunde erweitern und untersuche, inwiefern Schüler ihrer Lehrer und Peers als negative Motivatoren wahrnehmen. Wie im zweiten Artikel wurde hierfür eine latente Klassenanalyse und eine latente Veränderungsanalyse durchgeführt, um interindividuelle Unterschied und intraindividuelle Veränderungen aufzudecken. Als Ergebnis ließen sich sechs Typen unterschieden. Lehrer haben demnach nicht nur einen positiven Einfluss auf die Motivation von Schüler, sondern auch einen negativen. Peer werden dagegen nicht als negative Motivatoren wahrgenommen.

Die Ergebnisse dieser Dissertation helfen den Zusammenhang zwischen sozialen Beziehungen in der Schule und schulischer Motivation besser zu verstehen. Ein breites Wissen darüber, inwiefern Schülern ihre Lehrer und Peers als Motivatoren wahrnehmen, kann dabei helfen die Motivation von Schüler individuell zu fördern. Diese Dissertation liefert dazu einen wesentlichen Beitrag und gibt Einblicke in individuelle Unterschiede und intraindividuelle Veränderungen der sozio-motivationale (Un-)Abhängigkeit.

Der Lebenslauf ist in der Online-Version aus Gründen des Datenschutzes nicht enthalten.

Erklärung

Hiermit versichere ich, dass ich die vorliegende Arbeit selbständig verfasst und nur angegebene Hilfsmittel verwendet habe. Die aus anderen Quellen übernommenen Daten und Konzepte sind unter Angabe der Quelle gekennzeichnet. Die Arbeit wurde bisher in gleicher oder ähnlicher Form keiner anderen Hochschule zur Promotion vorgelegt.

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