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Social Relationships and Motivation in Secondary Schools: Interindividual Differences

vorgelegt von

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"Since we supposedly are teaching individuals, not groups of individuals, it is the function of the school within its budgetary personnel and curricular limitations to provide adequate schooling for every learner no matter how much he differs from every other learner" (Crow & Crow, 1973, p. 215).

CHAPTER 1

General Introduction

This chapter reviews current theories and some of the latest findings on scholastic motivation and social relationships in adolescents' school context. It describes the interplay between the individual and his or her school context during the developmental phase of adolescence. One of its main contributions is to focus on interindividual differences based on the ideas of the person-oriented approach.

1.1 Introduction

Psychology as a discipline strives to balance idiographic information and nomothetic observation, however as we will see, one side of this dialectic is often emphasized at the expense of the other. During the last century the idiographic goal of describing the individual as an agent with a unique life history replete with characteristics and events that set each individual apart from others, was widely substituted for the nomothetic perspective, which largely entails the search for laws that explain the generalities of objective phenomena. At least since the cognitive revolution and the emergence of the dimension-mathematics-experiment paradigm in the last century, research in psychology has been dominated by the nomothetic variable-oriented approach, which focuses on measurement, quantification, and objective statistical methods. One reason for the pendulum swing was that the former idiographic perspective was fraught with critiques of subjectivity, weak data and measurement, and difficulties in theory testing (Bergman, & Anderson, 2010). The paradigm shift brought with it vitalization and an explosion of knowledge within the field (Bergman & Andersson, 2010) and has led to a broader acceptance of psychology as a serious discipline

within the scientific community (Ittel & Raufelder, 2008). However, the transformation of the field was not without its disadvantages: adopting a nomothetic approach does not alter the fact that individual differences are a fundamental component of psychology, however, within the framework of variable-oriented statistical analyses these differences are often treated as "noise" or "errors" (Hampson & Coleman, 1995). Consequently, interindividual differences are often considered random and thus negligible (von Eye, Bogat, & Rhodes, 2006) and intraindividual differences, based on a whole-system perspective (Bergman & Andersson, 2010), in which the individual is seen as an organized whole (Bergman & Magnusson, 1997), have been neglected to a surprising extent. Hampson and Coleman (1995) remind us that: "One of the most important ways in which psychology differs from the natural sciences arises from the existence of individual differences. Two liters of hydrogen that are treated identically respond identically, but any two human beings, even identical twins, may respond quite differently to the same stimulus. This is because people differ from one another not only in appearance (that is, physically) but also in their behavior (that is, psychologically). Consequently, the study of individual differences…has been a significant part of psychology since ancient times" (p. X).

In 2004 Molenaar implored researchers to consider interindividual differences and as such reintroduce the individual into psychological research. Today, there is a small but emerging body of research using the person-oriented approach in developmental psychology, signaling a pendulum swing back towards the idiographic perspective, in which the individual is regarded as a dynamic system of interwoven components (Bergmann & Andersson, 2010) and as an organized whole (Magnusson, 1990), functioning and developing as a totality (Bergmann & Magnusson, 1997) unique from other individuals. The current research initiative is in response to Molenaar's (2004) appeal and begins with a brief theoretical and

methodological overview of the person-oriented approach and its implications for research in educational psychology.

1.2 Person-oriented approach in educational psychology

Individual differences are essential to psychology and especially to the field of educational psychology, wherein an assumption that each individual learns in the same way under the same conditions could never be true. The earliest philosophers and humanists emphasized the need to identify student interests and adapt instruction to individual needs and differences, and they wrote of the advantages of using self-comparisons rather than competitive social comparisons in evaluations of student's work and progress (Woolfolk, 2001). Crow and Crow (1973) remind us that: "educational psychology describes and explains the learning experiences of an individual from birth through old age" (p. 7). Furthermore, each person has an individual profile of characteristics, abilities and challenges that result from learning and their unique developmental history. These manifest as individual differences in intelligence, creativity, cognitive style, motivation, the capacity to process information, communicate, and relate to others (Woolfolk, Winne, & Perry, 2006). However, as a consequence of the dominance of variable-oriented statistical analyses, which assume equality between individuals, and a seeming reluctance on the part of researchers to employ person-oriented methods (Rosato & Bear, 2012), our knowledge about individual differences in educational psychology is limited.

One could argue that individual differences are considered in the discipline of differential psychology, which aims to identify the formal laws of variability (von Eye, 2010), but a basic assumption of research in differential psychology is that everybody can be assigned a location on the scales used for comparison (von Eye & Spiel, 2010). In contrast,

person-oriented research goes a step beyond this approach by acknowledging that particular concepts exist in or only apply to particular populations or even individuals. This basic tenet of the approach allows for the use of terms that are specific to populations, age groups, locations or historical times in the formulation of person-oriented theories. Furthermore, methodologically speaking, this tenet allows for the comparison of individuals based on the possibly changing structure of behavior domains, as well as based on the existence of behavioral domains (see von Eye & Spiel, 2010), as opposed to comparing individuals solely on their location on particular scales. In other words, person-oriented research does not proceed from the assumption that the validity of concepts and variables is universal (see von Eye, 2009, 2010). Instead, one of the fundamental tenets underlying the person-oriented approach (Bergman & Magnusson, 1997; Bergman, von Eye, & Magnusson, 2006; von Eye & Bergman, 2003) and idiographic psychology (Molenaar, 2004; Molenaar & Campbell, 2009; von Eye, 2004) states that premature aggregation of data can result in conclusions that fail to do justice to the variability in populations (von Eye & Spiel, 2010). Despite this principle, theoretical and methodological discussions within the person-oriented approach continue to proceed with the implicit assumption that the scales and measures used to describe individuals are universally valid (see von Eye & Spiel, 2010). In order to better understand these persistent assumptions, the next paragraph gives a short overview of the constituent characteristics of the person-oriented approach.

Characteristics of the Person-Oriented Approach

Before describing the constituent characteristics of the person-oriented approach, it should be noted that over the years the term "person-oriented" (often used interchangeably with the terms "person-centered" and "pattern-oriented") has acquired many different

meanings (Bergmann & Andersson, 2010). Additionally, some researchers do not distinguish between person-oriented theory and person-oriented methodology (Sterba & Bauer, 2010) and label their approach as "person-oriented" or "person-centered" if some kind of pattern analysis has been made, even within a variable-oriented framework (Bergman & Andersson, 2010). However, not every statistical analysis, which focuses the individual, is automatically person-oriented. Bergman and Andersson (2010) underline: "To a reasonable extent, the integrity of the system under study must also be retained" (p. 162). Due to the fact that to date there is no agreed upon single definition of a person-centered approach, this article summarizes the most common current perspectives on theory as well as methodology developed over the past thirty years and influenced heavily by the works of Bergman and Magnusson (Magnusson, 1988; Magnusson & Törestad, 1993; Bergman & Magnusson, 1997; Bergman, von Eye, & Magnusson, 2006).

The original six tenets (theoretical elements) of the person-oriented approach (Bergmann, 2001; Bergmann & Magnusson, 1997; von Eye & Bergmann, 2003) were adapted by Sterba and Bauer (2010) as the following person-oriented principles: (1) The individual-specificity principle holds that structure and dynamics of behavior are at least partly specific to the individual. (2) The complex-interactions principle implies the consideration of many factors and their interrelations to embrace the complexity of behavior. (3) The interindividual-differences/intraindividual-change principle assumes a lawfulness and structure to intraindividual constancy and change as well as interindividual differences in constancy and change. (4) The pattern-summary principle follows the idea that processes develop in a lawful way and can be described as patterns of involved factors. (5) The holism-principle states that the meaning of the involved factors results from the interactions between these factors. (6) Finally, the pattern-parsimony principle asserts that the number of different patterns is

infinite, but that some patterns occur more frequently than others. Von Eye (2010) postulates a reformulation of this last principle into expectancies, such as expected numbers of patterns should be specified, based on a number of arguments or model assumptions. The advantage of this approach is to test hypotheses concerning the observed frequencies of these events, which at the same time lightens the emphasis on predominantly descriptive statements (see Bergmann, Magnusson, & El-Khouri, 2003). In order to develop the environmental components of person-oriented research Bogat (2009) proposes two additional tenets: (a) "the structure and dynamics of individual behavior are, at least in part, specific to the environment in which the individual lives and work" as well as (b) "validity is specific to individuals and environments" (Bogat, 2009, p. 32).

The central question, which arises from these theoretical principles and approaches, is how to transform them into analytical methods. Sterba and Bauer (2010) discussed which of these person-oriented principles could be tested via four types of latent variable analyses for longitudinal data in developmental psychology: (1) Less-restrictive variable-oriented methods (e.g., latent growth curve model), (2) classification methods (e.g., latent class growth analysis; latent Markov model), (3) hybrid classifications methods (growth mixture models), and (4) single-subject methods (e.g., dynamic factor analysis) (for details see Sterba & Bauer, 2010). Despite this classification system, there remains a degree of arbitrariness in determining whether a given principle can be tested within each analytic approach (Mun, Bates, & Vaschillo, 2010). Although Mun, Bates and Vaschillo assert that there is currently an effort to better match theoretical concepts with analytical tools (Mun, Bates, & Vaschillo, 2010), there is still much disagreement about the appropriate use of person-oriented research methods. The next section discusses three statistical analyses that are often used in person-oriented research, that adhere to the precept of reintroducing the individual into psychological research

(Molenaar, 2004) and that are also helpful in answering research questions in educational psychology. The discussion aims to shed light on some of the difficulties inherent in integrating person oriented theory and methodology.

Methods of Analysis of Person-Oriented Research

In general, person-oriented methods enable the researcher to identify important intraindividual and interindividual differences and thus model distinct configurations of heterogeneity within a given sample (Rosato & Baer, 2012). That means that individuals are studied on the basis of their patterns of individual characteristics specific to the research question. It should be noted that such patterns can occur at different levels (from the molecular to the global) and that a single study can only address a few patterns. Bergman and Magnusson (1997) address the role of variables within this pattern-orientation: "It is sometimes objected that even the person-oriented approach is variable oriented because, for instance, in many of its applications, variables are used to construct profiles of individuals' scores which are then used in the statistical analysis. However, variables included in such an analysis have no meaning in themselves. They are considered only as components of the pattern under analysis and interpreted in relation to all the other variables considered simultaneously; the relevant aspect is the profile of scores" (Bergman & Magnusson, 1997, p. 293).

The basic goal in person-oriented research is to group individuals into categories, with each one containing individuals who are similar to each other and different from individuals in other categories (Muthén & Muthén, 2000). Von Eye and Bogat (2006) defined three criteria for person-oriented research: (1) a sample is analyzed under the assumption that it was drawn from more than one population, (2) attempts be made to establish external validity of

subpopulations, and (3) groups be interpreted based on theory. These general criteria, as well as the methodological issues raised by Sterba and Bauer (2010), Molenaar (2010), and Mun, Bates and Vaschillo (2010) presuppose that the scales, instruments, and measures used to identify differences in individual profiles and patterns are equally meaningful in all subpopulations and for all individuals, although the person-oriented approach is generally "open to the assumption that particular concepts exist in or apply to particular populations or even individuals only" (von Eye & Spiel, 2010, p. 153). These criteria can be better illustrated through an example: the statement that car drivers often feel pressured by other car drivers only makes sense for car drivers, and not for non car drivers (latter assumption). In contrast, if researchers want to compare Canadian and German students on motivation, they must be sure that Canadian and German students understand motivation in the same way (presupposition of equal meaning). Von Eye further explicates this presupposition in his concept of dimensional identity (for detail see von Eye, 2010) and its implicit condition of commensurability (for detail see von Eye & Spiel, 2010).

One popular analysis, which is often used in person-oriented research, and is the methodological foundation of this work, is latent class analysis (LCA) or latent profile analysis (LPA).

Latent Class Analysis (LCA) & Latent Profile Analysis (LPA)

Latent class analysis (LCA) and latent profile analysis (LPA) (Lazarsfeld & Henry, 1968) are conceptually related to cluster analysis. The advantages of these approaches over cluster analysis are that they are model based and as such generate probabilities for group membership. In other words, these models can be tested and their goodness of fit can be analyzed. In general, LCA and LPA are non-parametric statistical techniques based on the

assumption that patterns among a set of observed variables are explained by an unmeasured latent variable with discrete classes (Collins & Lanza, 2010; Lazarsfeld & Henry, 1968; McCutcheon, 1987). It is a multivariate method used to identify latent subpopulations of individuals based on multiple observed measures (Lubke & Muthén, 2005). The two forms of analysis use maximum likelihood estimation for the analysis of categorical (LCA) and continuous (LPA) outcomes and assume that the association between items can be explained by the existence of several latent classes. LCA and LPA examine individuals as a whole based on their patterns of observed characteristics (Bergman & Magnusson, 1997). Within one class, 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 the highest.

Integrating Person-Oriented and Variable-Oriented Analyses

By integrating person-oriented and variable-oriented analyses researchers attempt to minimize the weaknesses of each approach and maximize their strengths by combining disparate but complementary assumptions (variable-oriented vs. person-oriented). In such cases Bergman (1998; cf. Spiel, 1998) proposes the following sequence of analyses (see also von Eye, 2010): (1) Identifying operating factors by using exploratory, variable-oriented analyses (Feyerabend, 1975; von Eye & Bogat, 2006); (2) Identifying possibly existing subpopulations by using exploratory, person-oriented analyses (von Eye & Bogat, 2006); (3) Testing theoretical assumptions by using confirmatory person-oriented analyses of data from independent samples and; (4) Linking theories and results from the different research strategies by using variable-oriented analyses (Feyerabend, 1975; Molenaar & Campbell, 2009). The advantage of these combined analyses is self-evident: While the person-oriented approach is useful in its ability to describe different experiences for different profiles of

individuals, it does not reveal associations between variables that are common to all individuals. Therefore, by combining the methods researchers gain information about the profiles of distinct groups as well as generalities across entire samples.

There are other methods of analysis, which can be used in person-oriented research; some of them have yet to find a concrete application, such as comparative methods (Caramani, 2009) or symbolic data analysis (Billard & Diday, 2006), but others have been used extensively in the field of developmental psychology such as latent growth curve modeling (LGM), latent class growth analysis (LCGA), and latent Markov model (e.g., Sterba & Bauer, 2010; Bergman & Magnusson, 1997). An interesting area for future discussion would be the degree to which multilevel analyses in educational psychology can be understood as person-oriented analyses within variable-oriented research, seeing as school level, class level and individual student level analyses can be conducted simultaneously.

Conclusions

Interindividual and intraindividual differences are at the heart of educational psychology, which as a discipline concerns itself primarily with individual learning processes. Nevertheless, research in educational psychology (as in psychology general) has been dominated by variable-oriented research for decades. Results of variable-oriented research often provide information about students, children and adolescents on average, which does not allow for the implementation of learning support on an individual level. In contrast, the person-oriented approach, which has been developed in the field of developmental psychology, explicitly addresses interindividual as well as intraindividual differences. By outlining the theoretical and methodological characteristics of the person-oriented approach, the problems associated with matching the theoretical tenets of the approach with appropriate

methods of analysis, as well as the implications of the approach for educational psychology, this introduction highlights the urgent need to integrate person-oriented theory and methodology into educational psychology research. The main goal of this work is to take steps torward satisfying this need.

In sum, person-oriented research is essential to the field of educational psychology. The fact that individuals differ in abilities, capacities and personality characteristics as well as in their personal development necessitates the adoption of individual-centered perspectives in educational settings. It seems as though Crow and Crow's assertion from 1973 is still germane to current education policy: "Since we supposedly are teaching individuals, not groups of individuals, it is the function of the school within its budgetary personnel and curricular limitations to provide adequate schooling for every learner no matter how much he differs from every other learner" (p. 215).

1.3 Scholastic Motivation in Adolescence

Motivation Theories and Concepts

As psychologists we are interested in understanding, predicting, and/or influencing individual behavior. In other words, we endeavor to understand why human beings behave the way they do? Embedded within this question lies the concept of motivation, such that motivation is defined as an internal state or condition (equipollent described as physiological or psychological need, desire, or want) that serves to activate or energize behavior in order to achieve what is desired (see Kleinginna & Kleinginna, 1981). Besides needs and cognition, emotions play a key role in motivation: they can be understood as the base or drive of motivation, such that human beings are motivated to experience positive emotions and to avoid negative ones. According to Reeve (1996) motivation "involves the internal processes

that give behavior its energy and direction. Motivation originates from a variety of sources (needs, cognitions and emotions) and these internal processes energize behaviour in multiple ways such as starting, sustaining, intensifying, focusing, and stopping it“ (p. 2).

Historically, the first motivation research evolved from the work of Darwin (e.g., James, 1890; McDougall, 1923; see Cofer & Appley, 1964) and focused on the physiological or internal reasons (instincts or needs) for motivation (hunger, thirst, sexual desire, etc.). In line with these first works on motivation, Murray's (1937) classification of human needs should be mentioned, which Maslow (1965) later elaborated on by considering the interrelationships and hierarchical structure between the needs. In Murray's classification, needs are hypothetical constructs directing behavior toward certain goals, regardless of their structure and usefulness.

Following these initial conceptualizations of motivation, the research perspective shifted and the question of how behavior could be externally motivated became central to the field. The paradigm shift was initiated and represented by classical proponents of learning theory (Hull, 1943; Spence, 1956), by Lewin's field theoretical approach (1926) as well as by Freud's drive theory (1930). This could be described as the first attempt to link motivation with education, based on the idea of influencing an individual's behavior by activating her/his motivation through external stimuli. One limitation of these theories was that they "portrayed the human as a machine-like reactive organism compelled to act by internal and/ or external forces beyond our control (e.g., instincts, needs, drives, incentives, reinforces, etc.)" (Gollwitzer & Oettingen, 2001, p. 10110); conscious reflections and attempts towards self-regulation were beyond their scope.

Later, under the influence of the humanist movement, motivation theorists (e.g., Maslow, 1954, 1965; Atkinson, 1957, 1964; McCleelland, 1955, 1961) distinguished (a)

motivation common to animals and human beings and (b) motivation unique to human beings. While the first category was mainly based on needs related to survival, the second category of motivation was based on the needs of psychological growth and fulfillment (Saha, 2006). Therefore psychological needs were no longer reduced to genetic or biological factors, but rather understood as the products of experience and not necessarily critical for survival in the sense of subsistence (Saha, 2006).

Today there are many theoretical approaches and models elucidating the concept of motivation, each emphasizing different facets, i.e. personality, social cognition, developmental history, some of which are inter-related (Waugh, 2002). Most theoretical approaches in motivation research assume that motivation is involved in the performance of all learned responses (Saha, 2006). In other words, learned behavior will not occur unless it is energized, or motivated. A crucial question is whether motivation is a primary or secondary influence on behavior: do concepts unique to motivation better explain changes in behavior *or* principles of environmental and ecological influences, such as memory, perception, cognitive development, emotion, and personality (Huitt, 2001)? To date there is no certain answer to this question. However, it is certain that motivation is one of the most important psychological concepts within the school context. As the long tradition of motivation research has shown, motivation is related to various outcomes such as curiosity, learning, persistence and performance (e.g., Deci & Ryan, 1985), which underscores its importance for school and educational psychology.

Motivation in School

In school, teachers and educators want students to be motivated to learn. The sources of motivation to learn can be categorized as either extrinsic (outside the person) or intrinsic

(internal to the person). While intrinsic motivation refers to doing something because it is inherently interesting or enjoyable, extrinsic motivation refers to doing something because it leads to a separable outcome (Ryan & Deci, 2000a), such as rewards. More than four decades of research has shown that the quality of experience and performance can be very different when one is behaving for intrinsic versus extrinsic reasons. While intrinsic sources can be subcategorized as either physical (body), mental (mind) (i.e., cognitive/thinking, affective/emotional, conative/volitional) or spiritual (transpersonal), extrinsic sources are connected with operant conditioning (Huitt, 2011) (see Figure 1).

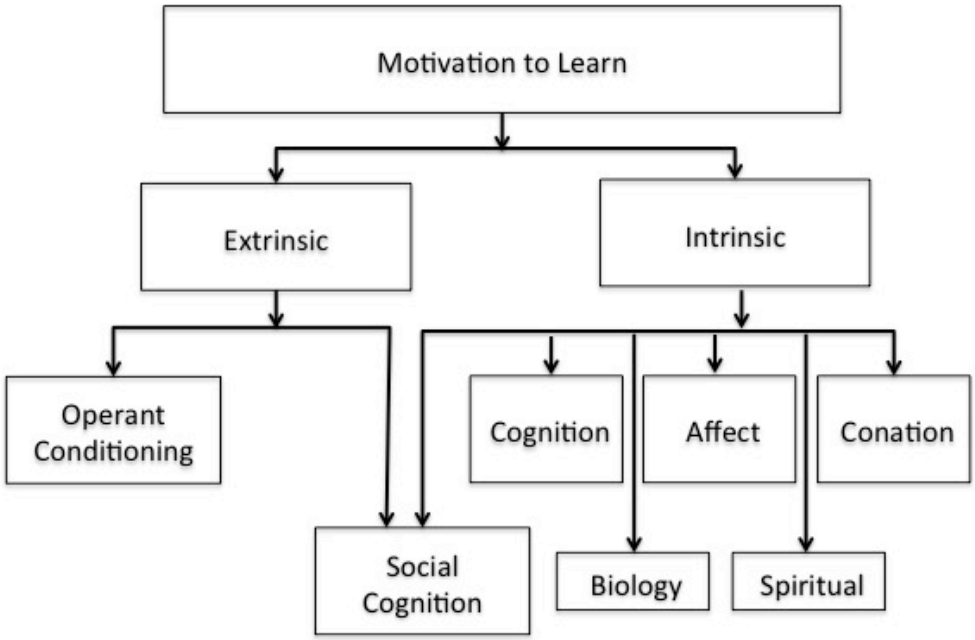

Figure 1. Categorical system of explanations regarding the source(s) of motivation (Huitt, 2011)

The overall goal of teachers and educators is to nurture the development of intrinsic motivation as a natural wellspring of learning and achievement. But teachers cannot always rely on intrinsic motivation to foster learning. Sometimes specific tasks or subjects are not

inherently interesting or enjoyable for all students, so that teachers and educators need alternative strategies to support student's motivation to learn. Actually, one often underestimated approach is fostering extrinsic motivation. Although extrinsic motivation has been characterized as a pale and impoverished form of motivation when compared to intrinsic motivation (e.g., de Charms, 1968), Deci and Ryan (1985) propose in their Organismic Integration Theory (OIT) as a sub-theory of their self-determination theory[1] (SDT) that there are varied types of extrinsic motivation. In total, Deci and Ryan distinguish four different types of extrinsic motivation, which vary in terms of their relative autonomy: (1) externally regulated behavior, (2) introjected regulation of behavior, (3) regulation through identification, and (4) integrated regulation. While the first type represents an impoverished form of motivation, the third and fourth types of extrinsic motivation represent active, agentic states. The second type is a mixed form, in that students feel motivated to demonstrate ability to maintain self-worth (Ryan & Deci, 2000b). In other words, students' performance of extrinsically motivated actions can be dominated by resentment, resistance, and disinterest, or – considering the third and fourth type – supported with an attitude of willingness and a sense of volition. If we transform this knowledge into classroom practice, an essential strategy for successful teaching is to promote more active and volitional (versus passive and controlling) forms of extrinsic motivation.

Need-Motivation Theories. Deci and Ryan not only put forward the distinction between intrinsic motivation and different phases of extrinsic motivation, they also formulated and established a theoretical framework that currently dominates scientific inquiry into the complex field of motivation in school: self-determination theory (SDT) (Deci, &

[1] for details on SDT see next paragraph

Ryan, 1985). Deci and Ryan's SDT is anchored in the tradition of need-motivation theories, which are mainly grounded in Maslow's classic hierarchy of needs (1943). As mentioned-above, Maslow extends McDougall's and Murray's need system by postulating that needs are hierarchically structured. Although Maslow himself never used a pyramid to illustrate his ideas, his hierarchy became famous portrayed in this way (see Fig. 2). The pyramid is structured with the largest and most fundamental needs at the bottom and the need of self-actualization at the top. In total, he distinguishes five patterns of needs, which human motivation generally evolves through: (1) Physiological needs, (2) Safety, (3) Belongingness and Love, (4) Esteem, and (5) Self-Actualization and Self-Transcendence.

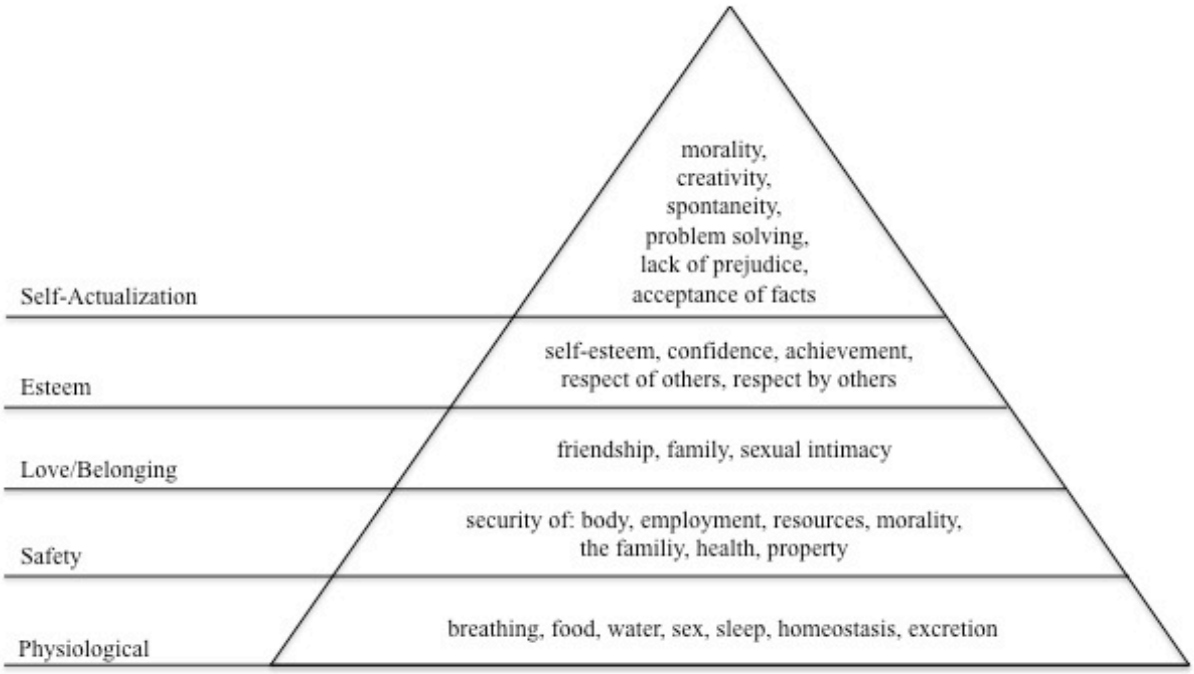

Figure 2. Maslow's Hierarchy of Needs (according to Maslow, 1943)

These five patterns are split into two groups: deficiency needs and growth needs. Deficiency needs (often labeled as d-needs) are the four lower stages. Maslow's theory suggests that the most basic level of needs must be fulfilled before needs higher in the hierarchy become salient (van Raaij & Wandwossen, 1978). To describe people who go beyond the scope of the basic needs and strive for growth and constant betterment, Maslow coined the term metamotivation (Goble, 1970).

Discussions pertaining to the weak points of Maslow's theory tend to criticize the order and ranking in which the hierarchy is arranged. For example, Wabba and Brudwell (1976) found little evidence for the ranking of Maslow's needs or a hierarchical structure of needs at all. Hofstede (1984) characterized the hierarchy as ethnocentric such that differences in social and intellectual needs between individualistic and collectivistic societies had not been considered (Cianci & Gambrel, 2003). In addition, the position and value of sex on the hierarchy has recently come into question, particularly that sex is characterized as a physiological need along with for example food, breathing and sleep and that the need for sex must be satisfied before a person can aspire to higher levels of motivation (Kenrick, Griskevicius, Neuberg, & Schaller, 2010). Despite its limitations, Maslow's theory of needs, inspired many other need-motivation theories (e.g., Herzberg's two-factor theory, Aldorfer's ERG (existence, relatedness and growth) theory). Another such theory, which as we have seen dominates the field of scholastic motivation, is self-determination theory.

In contrast to Maslow, Deci and Ryan proposed in their SDT that individuals have only three innate, psychological needs: relatedness, autonomy, and competence (Deci & Ryan, 1985). Relatedness is defined as the universal need to interact, be connected to and experience caring for others (Baumeister, & Leary, 1995), whereas autonomy is defined as the universal urge to be a causal agent in one's own life and act in harmony with one's integrated

self (Deci, & Vansteenkiste, 2004). The need for competence is defined as being effective in dealing with one's environment (White, 1959). Satisfying these basic psychological needs is vital for one's enjoyment, personal growth, and well-being (Deci, & Ryan, 2000) and is positively related to intrinsic motivation and adjustment (e.g. Jang, Reeve, Ryan, & Kim, 2009; Pfaeffli, & Gibbons, 2010). In adolescence, schools can be understood as potentially need-supportive environments, which may or may not foster the satisfaction of these needs. Regarding inter- and intraindividual differences, research has shown that both students' motivation in school (Mouratidis, Vansteenkiste, Sideridis, & Lens, 2011) and need satisfaction (Deci, & Ryan, 2000) can vary individually. In addition to need-motivation theories, theories regarding attribution and goal motivation are also essential to any discussion of motivation in school.

Attribution and Goal Theories of Motivation. McClelland (1955) postulated in his early theory of learned needs that needs are socially acquired or learned. After a series of empirical tests, McClelland identified three needs that he deemed to be independent of culture and/or gender: achievement, affiliation and power. McClelland asserted that the extent to which these needs are present varies from person to person, depending on the individual and his or her environmental background. Ongoing empirical studies have confirmed McClelland's theory (1995), which is currently often used in field of industrial psychology. Based on McClelland's theory and findings, Atkinson (1957, 1964) introduced an expectancy-value model of achievement motivation. In comparison to early achievement motivation theories, which are based on the idea that achievement motives are dispositional and thus acquired early and remained stable over the life course (Meece, Glienke, & Askew, 2009), Atkinson's model went beyond personality and disposition to include cognitive assessments represented by the person's subjective expectation for success. In general,

Atkinson differentiated success- and failure-motivation (Atkinson, 1957, 1958). While success-motivation or hope of success is the ability to feel pride in one's performance, failure-motivation or fear of failure is the tendency to avoid failure and is linked to feeling shame about failure. In practical terms this means that students who tend to be success-motivated tend to choose tasks which are barely manageable (Langens & Schüler, 2006). In order to prove themselves, they actively search for achievement situations and feedback on their performance. In contrast, students who tend to be failure-motivated, avoid tasks in general and achievement situations in particular. If they can not avoid achievement situations, they tend to choose either simple tasks where success is guaranteed or extremely difficult tasks in which failure can be attributed externally (Rheinberg, 2000). Atkinson's attribution theory dominated the field of motivation research during the 1970s and early 1980s and was often used to examine gender differences in motivation and achievement behavior (Meece, Glienke, & Askew, 2009). Furthermore, all theories that currently dominate the field of motivation research: cognitive attribution theory (Weiner, 1985); self-worth theory of achievement motivation (Covington & Berry, 1976); achievement goal theory (Elliot, 1997; Pintrich, 2003); self-determination theory, (Deci & Ryan, 1985), and social-cognitive theory (Bandura 1986; Pajares 1996) are generally based on Atkinson's germinal approach.

Another important theory in the area of achievement motivation, which is of central importance to understanding student's motivation to learn and which is associated with the ideas of attribution theory, is goal theory (Pintrich, 2000). A person's reasons for choosing, performing, and persisting at various learning activities are the focus of this theoretical approach. Within goal theory, three separate types of goals are differentiated (see Huitt, 2011): (1) *mastery goals* (often called learning goals), which focus on gaining competence or mastering a new set of knowledge or skills; (2) *performance goals* (often called ego-

involvement goals), which focus on achieving normative-based standards, doing better than others, or doing well without a lot of effort; and (3) *social goals,* which focus on relationships among people (see Ames, 1992; Dweck, 1986; Urdan & Maehr, 1995). Studies have shown that the tendency to avoid failure is often associated with performance goals, whereas the tendency to achieve success is more often associated with mastery goals (see Huitt, 2011). The relatively structured character of learning in school contexts supports students with a tendency toward mastery goals, however it is the case that students with performance or social goals are less supported (Huitt, 2011).

All abovementioned theories of motivation have something in common: they highlight interindividual differences in motivation, with each individual having their unique pattern of goals and needs. In terms of student's motivation to learn in the school context, the theoretical approaches beg the following question: how can students' motivation to learn be increased in an effective way by considering these interindividual differences?

Increasing Students' Motivation in Adolescence

As several studies have shown (e.g., Harter, 1996; Harter, 1981; Eccles, & Midlegy, 1988; 1990), there is a grade-related shift from a predominantly intrinsic motivational orientation in elementary school, to a more extrinsic motivational orientation in secondary school. The distinction between intrinsic and (different forms of) extrinsic motivation helps us to understand student behavior within the classroom context (Harter, 1996). When a student's motivation to learn is driven by an intrinsic interest in the subject material, curiosity and a preference for challenge predominate, whereas the desire to obtain grades or to win teacher approval are characteristic of an extrinsic motivation. Several studies have examined the developmental course of these motivational constructs (e.g., Harter, 1996; Harter, & Jackson,

1992; Newman, 1990; Tzuriel, 1989). Based on the assumption that intrinsic and extrinsic motivation can be characterized as opposing poles on a single dimension, Harter (1981) has demonstrated, with regard to developmental differences, a systematic grade-related decrease in intrinsic interest in learning in general from grade three to grade seven, with a corresponding increase in extrinsic orientation. Gottfried (1981; 1985) documented a similar pattern of decline in intrinsic motivation in 7th grade for specific school subjects (reading, science, math and social studies). These findings of a developmental decrease in overall academic intrinsic motivation were revealed likewise in recent studies using Gottfried's (1985, 1990) more content-specific scales of academic intrinsic motivation, with particularly marked decreases in the critical content areas of math and science (Gottfried, Fleming, & Gottfried, 2001).

Research examining the constructs independently, as opposed to on the same scale, found intrinsic and extrinsic motivation to be only moderately correlated, suggesting that they may represent largely orthogonal dimensions of motivation in school (Lepper, Corpus and Iyengar, 2005). When understood to be largely independent, Lepper and colleagues (2005) showed that intrinsic motivation declines across grade levels from 3rd through 8th grade, whereas extrinsic motivation shows few differences across grade levels and is negatively correlated with academic outcomes.

In an attempt to explain the decline in intrinsic motivation, several studies (Eccles, & Midgley, 1988; 1989; 1990; Kohn, 1993) have identified a critical change in the school environment in American Schools (as well as in German schools): the transition from elementary school to secondary school is attended by a more formal, impersonal, evaluative, and competitive school environment. The teacher, as an ambassador of the school, communicates these changing values and standards. Unfortunately, these changes are in

contrast to the adolescents' growing needs for relatedness and autonomy. Teachers become more controlling, exactly at the point that adolescents are seeking more autonomy (Eccles, Midgley, & Adler, 1984; Eccles, & Midgley, 1990). Furthermore, the teacher-student relationship becomes more impersonal precisely at the time that students, in their bid for autonomy, increasingly need the personal support of adults other than their parents (Eccles, Midgley, & Adler, 1984; Eccles, & Midgley, 1990). In addition, various forms of social comparison with peers contradict the need of relatedness. To summarize, the greater focus on competition and order, coupled with teachers' decreasing personal interest in students, can lead students to reevaluate their sense of competence (Harter, 1996). Although this problematic association between transitions in school environments and the decline in intrinsic motivation has been well documented for nearly twenty years, very little has changed in the structure of the school environment, neither in America nor in Germany. The problem seems to be a societal one (Lepper, Corpus, & Iyengar, 2005): competition and external rewards govern most aspects of daily life – not only the school context. Bolstering the development of intrinsic motivation becomes essential if we are to work against this social phenomenon. SDT-oriented studies have shown that teachers' support of the basic psychological needs of students for autonomy, competence, and relatedness facilitates their autonomous self-regulation for learning, academic performance, well-being (Jang, Reeve, Ryan, & Kim, 2009; Niemiec & Ryan, 2009; Standage, Duda, & Ntoumanis, 2006; Tsai, Kunter, Lüdtke, Trautwein, & Ryan, 2008). Further research on self-determination theory in educational settings has shown (e.g., Jang et al., 2009; Reeve, Deci, & Ryan, 2004), teachers' interpersonal styles with students can be conceptualized along three dimensions: autonomy support, structure, and interpersonal involvement. These three dimensions should be considered when developing strategies to strengthen students' perceptions of self-

determination. Specifically, the need for autonomy can be supported through promoting autonomy-supportive or student-centred teaching behaviours by teachers (Chirkov & Ryan, 2001; Radel, Sarrazin, Legrain, & Wild, 2010; Roth, Assor, Kanat-Maymon, & Kaplan, 2007; Soenens & Vansteenkiste, 2005); the need for competence can be supported through teacher feedback and teaching style (Katz & Assor, 2007; Niemiec & Ryan, 2009); and finally, the need for relatedness can be supported through strong peer and teacher relationships including interpersonal involvement (Katz & Assor, 2007; Niemiec & Ryan, 2009). SDT proposes that the interpersonal context influences the extent to which individuals feel autonomous versus controlled (Deci, & Ryan, 1985). A teacher, as an individual in a position of authority, should take the student's perspective, acknowledge the student's feelings, and provide opportunities for choice and autonomous problem solving, while avoiding the use of pressures and demands. Several SDT studies have shown that autonomy-supportive or student-centered teaching behaviors affect students' intrinsic motivation, class participation (e.g., Radel, Sarrazin, Legrain, & Wild, 2010; Roth, Assor, Kanat-Maymon, & Kaplan, 2007; Soenens & Vansteenkiste, 2005) and academic achievement through their positive influence on school-related values, interest and goals (Eccles, & Roser, 1999). On the other hand, controlling teaching behaviors such as, lack of choice in the classroom, boring tasks, and low teacher support undermine motivation leading to disengagement and withdrawal (Roeser, & Eccles, 1998; Skinner, & Belmont, 1993).

Based on STD and empirical findings on student's motivation, Huitt (2011) defined the following rules for teachers: whenever possible, teachers need to use as much of the intrinsic-supporting techniques (such as explaining or showing why learning a particular content or skill is important, allowing students some opportunities to select learning goals and tasks, creating and/or maintain curiosity, providing a variety of activities and sensory

stimulations, setting learning goals, relating learning to student's needs, helping students developing a plan of action), while recognizing that not all students will be appropriately motivated by them. Additionally, extrinsically-oriented techniques can be used (such as providing clear expectations, giving corrective feedback, providing valuable rewards for simple learning tasks, making rewards available, allowing opportunities for students to observe more correct exemplars, allowing opportunities to engage in social learning activities, and providing scaffolding of corrective feedback), keeping in mind that they are only effective when the individual student's motivation is influenced by external factors (see Stipek, 1988; Sternberg, 1994).

In summary, the outlined different theoretical approaches and empirical findings are constituent parts of the term "scholastic motivation" in the present work, which I define and understand as a student's internal state that energizes behavior in order to attain learning goals, and bring about academic achievement and school engagement. One dimension of the academic environment, which is associated with adolescents' scholastic motivation and has been understudied in motivation research, is the role of social relationships in the school context.

1.4 Social relationships in adolescents' school context

School is not only a context for students' learning, achievement and motivation, it is also an important social learning context (Harter, 1996) for personal development and need fulfillment. Students have social interactions and build social relationships with their teachers, with close friends, and with their non-friend classmates (Urdan & Schoenfelder, 2006). The social setting of the classroom is dominated by interactions with peers and teachers, which

can be a supportive or undermining source of intrinsic motivation (for reviews, see Deci & Ryan, 1985; Reeve, Deci & Ryan, 2004; Ryan & Stiller, 1991).

Classmates serve as potential companions and friends and as such are connected with important social needs of the developing child (Harter, 1996; Rubin, Bukowski, & Laursen, 2009; Rubin, Bukowski, & Parker, 2006). Several studies have shown that relationships with peers in the classroom play a critical role in the behavioral, emotional, and cognitive orientations that children develop toward school (Ladd, Herald-Brown, & Kochel, 2009; Juvonen, & Wentzel, 1996; Wentzel 2005; 1996). Throughout the course of learning, students engage in social activities, such as competitions and negotiations with others, saving face, asking for help and working in teams (Ming-tak, 2008). The positive and negative effects of peer relationships on academic performance and one's sense of belonging and adjustment are wide-ranging. Positive peer relationships and friendships in class appear to influence different dimensions of school adjustment (Berndt, 1999), such as school engagement (Estell & Perdue, 2013; Perdue, Manzeske, & Estell, 2009; Ladd, Herald-Brown, & Kochel, 2009), well-being (Hascher, 2004; Hascher, 2011), attitudes towards school (Berndt, 1999), and motivation (Wentzel, Donlan & Morrison 2012; Wentzel, Battle, Russell, & Looney, 2010: Wentzel, 2005; Wentzel, 2009b). Students who reported a greater sense of belonging within the school context demonstrated more scholastic motivation and engagement than their peers who reported more loneliness (Coie, 1990; see Tresch Owen & Bub, 2011). Furthermore, students with higher peer acceptance showed higher achievement and motivation (Wentzel, 1991). Other empirical longitudinal studies have shown that student's motivational orientation during a school term is mainly influenced by the initial motivational orientation of the peer group in which they were constituents (Kindermann, 1993; Hymel, Comfort, Schonert-Reichl, & McDougall, 1996; Wentzel, 2009b).

In contrast, negative peer relationships are associated with poorer adjustment in school (Tresch Owen & Bub, 2011). Longitudinal studies have shown that students who have troubled relationships (e.g., peer rejection, peer victimization) with their peers later show poor school performance and truancy (i.e., Ollendick, Weist, Borden, & Greene, 1992; Coie, Lochman, Terry, & Hyman 1992; DeRosier, Kupersmidt, & Patterson, 1994). Furthermore, students who are rejected by their peers are at greater risk of academic failure (Ladd, Kochenderfer, & Coleman, 1997).

Another relationship that dominates students' daily school life and affects their scholastic motivation as well as aspects of personal development and growth is the teacher-student relationship. The need for connection between students and teachers in the school setting remains strong from preschool to 12th grade, although the nature of these relationships change as students mature (Crosnoe, Johnson, & Elder, 2004; Hamre & Pianta, 2006). In early school years, positive relationships with teachers particularly benefit children who display early academic or behavior problems (Hamre & Pianta, 2006). Later, positive teacher-student relationships may be extra supportive during transition periods, e.g. from elementary school to middle school (Wentzel, 1998). In general, the teacher-student relationship is closely related to students' learning processes: students' learning efforts must be understood as the product of a complex dynamic of educational practices (teaching styles), and student (Hodis, Meyer, McClure, Weir, & Walkey, 2011) and teacher characteristics, including multiple social, cognitive and emotional variables (Nickel, 1981; see Raufelder, 2007). Furthermore, studies have underlined the critical and central role of the teacher-student relationship in motivating and engaging students to learn (Becker & Luthar, 2002; Pianta, Hamre, & Stuhlman, 2003; Stipek, 2004). In the literature, positive teacher-student relationships are characterized as secure and emotionally supportive, and result in a sense of

belongingness and relatedness in students (Wentzel, 2009). If students perceive their teacher as emotionally supportive, this supports in turn a positive sense of self, the adoption of socially desirable goals and values, as well as the development of social and academic competencies for the developing child (Wentzel, 2009). Teachers, due to their special role in the learning process, provide students with academic support and monitoring (Régner, Loose, & Dumas, 2009) as well as opportunities to increase their motivation (Dörnyei, 2001; Kochhar, 1985). In addition, perceived support from teachers positively predicts effort in school, school and class-related interest and the pursuit of social responsibility goals, including acting in prosocial ways that encourage peer cooperation (Wentzel, 1997; 1998; see Urdan & Schoenfelder, 2006). In contrast, if students perceive their teachers as harsh and cold, they consistently display poorer social behavior and lower social goals as well as academic achievement in comparison with their peers who perceive their teachers as supportive (Wentzel & Battle, 2001). Additionally, particularly in adolescence, teachers provide support from an adult other than a parent (Raufelder, 2007). Teachers might act as role models for students and communicate their more general approval or disapproval for the student as a person (Birch & Ladd, 1996), which can affect students' sense of identity (Birch & Ladd, 1997; 1998; Alerby & Hertting, 2007; Jennings & Greenberg, 2009) and therefore their degree motivation.

In summary, although there is a growing body of research on the association between peer relationships and academic achievement, the potential impact of peer relationships on scholastic motivation has been relatively unexamined (Ladd, Herald-Brown, & Kochel, 2009; Fredricks, Blumenfeld, & Paris, 2004; Ryan, 2001). In addition, most research on the teacher-student relationship is now obsolete and/or focused on children in elementary school (Hamre & Pianta, 2006). Furthermore, less is known about the scholastic motivation of adolescent

students that perceive their student-student relationship and/or teacher-student relationship to be negative (Hamre & Pianta, 2006), or so-called loners (Demuth, 2004), who do not have and/or need strong social relationships. In other words, as a consequence of the dominance of variable-oriented statistical analyses, our knowledge about interindividual differences in adolescents' scholastic motivation is limited.

The general design of the present work was conceptualized using a person-oriented approach with the aim of addressing the abovementioned gap in the literature and is grounded in the demonstrated interdependency between adolescent students' scholastic motivation and social relationships in school. In detail, based on the theoretical framework and the empirical findings outlined-above, the present work examined the following hypotheses:

(1) Adolescent students differ in their perception of peers and teachers as source of motivation. At least, four different MTs can be distinguished: (1) peer-and-teacher-dependent MT, (2) teacher-dependent MT, (3) peer-dependent MT, (4) peer-and-teacher-independent MT.

(2) Students will differ in their self-determination and school engagement depending on their socio-motivational dependency. In detail, it was expected that students with a high socio-motivational dependency (peers and teachers as source of motivation) might have the highest mean values on competence (through teacher support) and relatedness (trough peer support), whereas students with no socio-motivational dependency (independent of peers and teachers as source of motivation) might have the highest mean value on autonomy. In addition, we assumed students with a high socio-motivational dependency would show more school engagement as the independent students, as two of his/her basic needs (competence and relatedness) would be well satisfied.

(3) Self-determination function as a predictor of school engagement of each MT differently. In detail, we assumed that relatedness would be a stronger predictor of school engagement for students with a peer-dependency. In contrast, the school engagement of students who are independent from teachers and peers as source of motivation could be better fostered through autonomy. In addition, we expected that competence would be a stronger predictor of school engagement for students with a teacher-dependency, based on the institutional and professional role of the teacher.

1.5 General Design of this Ph.D. study

The following example illustrates the relevance of the person-oriented approach to the field of educational psychology. Variable-oriented research in educational psychology typically produces results framed in the following way: for most adolescent students, positive social relationships in school are supportive of academic achievement and scholastic motivation (Wentzel et al. 2010; Wentzel, 1998). Indeed it is important to understand the experiences of most students, but what about the other students? Although much is known about the respective roles of teacher and peer support in motivational outcomes, much less is known about students with relatively constant levels of academic achievement and motivation independent of teachers and/or classmates. Therefore, using a person-oriented approach, the main research question of this dissertation was: Are social relationships important for scholastic motivation for all students, or are there different motivation types, including a type which does not need any or only limited social support from teachers and/or classmates in order to be motivated?

In order to enhance our understanding of interindividual differences in adolescents' scholastic motivation, I examined in my dissertation the interplay of social relationships and

scholastic motivation following a person-oriented approach. This project consisted of three different steps. In a first step, a scale (REMO = Relationship & Motivation) was developed using information from both the motivation and the social relationships in school literatures. Furthermore, aspects of developmental psychology were included in order to consider the specific developmental phase of early adolescence. Based on the multi-dimensional character of motivation we focused not on any one specific aspect of motivation, but rather emphasized the interconnection between motivation and social relationships in school. Although much is known about the relationship between teacher and peer support and motivational outcomes (Wentzel, Battle, Russell, & Looney 2010; Wentzel, 1998), all existing knowledge derived from quantitative research must be understood as the product of indirect variable-oriented measurement (i.e., the association between variables of motivation and variables of relationships). Items for the REMO scale were developed to address the lack of existing motivation measures that incorporate both social relationships and motivation into one scale.

In a second step, by using the REMO-scales "Peers as positive Motivators" (PPM) and "Teachers as positive Motivators" (TPM) a confirmatory latent class analysis (CLCA) was conducted in order to enhance our understanding of interindividual differences in scholastic motivation. Person-oriented methods, such as latent class analysis (LCA), enable the researcher to identify important interindividual differences and thus model distinct configurations of heterogeneity within a given sample (Rosato & Baer, 2012). Based on my preliminary research in an ethnographic field study (Raufelder, 2007), four different motivation types (MT) were expected: (1) peer-dependent MT, (2) teacher-dependent MT, (3) peer-and-teacher-dependent MT, (4) peer-and-teacher-independent MT. By using Confirmatory Latent Class Analysis (CLCA) the four-class-solution was confirmed.

In a third step, self-determination was tested as a predictor of school engagement of the four different motivation types using a combination of person- and variable-oriented analyses. Firstly, the four types were compared on latent variables (perceived self-determination and school engagement) by using structural equation modeling (SEM). Secondly, multigroup SEMs were constructed to examine the three aspects of self-determination (competence, relatedness, autonomy) as predictors of school engagement for each MT.

Finally, findings of all three steps (studies) have been summarized, including theoretical and practical implications, future directions as well as general conclusions.

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CHAPTER 2

STUDY I:

Development and validation of the Relationship and Motivation (REMO) scale: Assessing students' perceptions of peers and teachers as motivators in adolescence

Abstract

Factor analyses of a newly developed measure designed to measure adolescents' perceptions of peers and teachers as sources of scholastic motivation were conducted with a diverse sample of 7th and 8th grade students (N=1088) in secondary schools. The Relationship and Motivation (REMO) scales measure perceptions of peers (P-REMO) and teachers (T-REMO) as motivators of school performance. Analyses confirmed a two-factor solution for the teacher items and a three-factor solution for the peer items, with acceptable internal consistency, and along hypothesized conceptual dimensions. Students' scores on the REMO were significantly associated with different aspects of academic achievement motivation and achievement goal orientation. Results indicate that the REMO scales are robust and well-suited for use in research on achievement and motivation in schools.

Keywords: Scale development, Motivation, Social relationships, Adolescence, Factor analyses, Structural equation modeling

Raufelder, D., Drury, K., Jagenow, D., Hoferichter, F. & Bukowski, W. (2013). Development and Validation of the Relationship and Motivation (REMO) scales to assess students' perceptions of peers and teachers as motivators in adolescence. *Learning and Individual Differences, 23*, 182–189. doi: 10.1016/j.lindif.2013.01.001

Development and validation of the Relationship and Motivation (REMO) scale: Assessing students' perceptions of peers and teachers as motivators in adolescence

2.1 Social Relationships and Motivation

Although there is widespread agreement in the literature that motivation results from an interplay between personality, social cognition, developmental history and social relationships (Waugh, 2002), some of these factors have received more attention than others. If one in particular has been understudied it is the role of relationships in the school context. Adolescence is an interesting period to study the role of relationships in scholastic motivation for two reasons. First, past research suggests an overall decline in scholastic motivation during this developmental period (Harter, 1996; Eccles, Midgley, & Schiefele, 1998; Eccles, Midgley, & Adler, 1984). Second, social relationships outside the family take on new meaning and importance (Cook, Deng & Morgano, 2007; Fend, 1998; Brown & Theobald, 1999).

Motivation is commonly defined as an intervening process or internal state of an organism that impels or drives it to action (Reber & Reber, 2004). In this sense, motivation is an energizer of behavior that plays a fundamental role in learning. As human beings we are naturally motivated to satisfy our drives and needs (Maslow, 1943) and, in the process, we learn the optimal ways of doing so. In the academic context, we define scholastic motivation as being the student's drive or need to learn and master the classroom material. It has been shown that in adolescent students' scholastic motivation declines rapidly starting after the transition to secondary school and continuing throughout the first three years of high school (Harter, 1996), reaching its nadir in grade nine (Eccles, Wigfield, & Schiefele, 1998; Watt, 2004; Zushno & Pintrich, 2001). Although these motivational changes vary across

adolescents (Mouratidis, Vansteenkiste, Sideridis, & Lens, 2011), one can tentatively speak about an overall decline in scholastic motivation across the adolescent years.

Developmental contextualism (Lerner, 1998, 1986, 1991, 1992) provides an excellent framework from which to better understand this decline in scholastic motivation. Developmental contextualism is a theory of human development that focuses on the changing *relations* or coactions (Gottlieb, 1997) between the developing individual and his or her context. We believe developmental contextualism is a useful theoretical perspective for understanding the contemporary challenges involved in adolescents' motivation and their peer and teacher relationships in the school context. Using this theory, 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 over time. Applied to students' motivation during the developmental phase of adolescence, student-student relationships and teacher-student relationships become essential influence factors. In line with the work of Hamre and Pianta (2006) who applied developmental contextualism to the school context, and specifically to the teacher-student relationship, we understand scholastic motivation to be one component of a dynamic process involving the interactions between the developing adolescent and his or her school context (peer relationships, teacher relationships). In addition, developmental contextualism provides a rationale for identifying and measuring students' diverse perspectives and perceptions and as such addressing questions of inter- and intraindividual differences.

In their role as students, adolescents spend a significant portion of their time in school. Not surprisingly then, the classroom setting functions not only as an educational arena, but also as a powerful social learning context (Harter, 1996). Based on the increasingly complex nature of social relationships during adolescence (Bukowski, Simard, Dubois, & Lopez, 2011)

both the teacher-student relationship and the student-student relationship become essential for personal development (Harter, 1996; Birch & Ladd, 1996; Erikson, 1959) as well as for motivation (Wentzel, 2009; Wentzel, Battle, Russell, & Looney, 2010; Harter, 1996) and academic achievement (Flanagan, Erath, & Bierman, 2008; Raufelder & Mohr, 2011; Wentzel, 1998).

As research has shown, school-based peer relationships are an important context for social engagement and scholastic motivation (Ladd, Herald-Brown & Kochel, 2009; Juvonen & Wentzel, 1996; Wentzel, Battle, Russell, & Looney, 2010). Peers in school serve as potential companions and friends and can fulfill important social needs of the developing adolescent (Harter, 1996; Rubin, Bukowski & Laursen, 2009; Rubin, Bukowski, & Parker, 2006). During the last decades several studies have provided evidence of the wide-ranging positive effects of peer relationships on academic achievement (Ladd & Kochenderfer, 1996; Birch & Ladd, 1996; Achermann, Pecorari, Winkler-Metzke, & Steinhausen 2006; Kindermann, McCollam, & Gibson, 1996) and motivation (Kindermann, 1993; Wentzel, 2009a, 2009b). Findings from longitudinal studies (i.e., Ollendick, Weist, Borden, & Greene, 1992; Coie, Lochman, Terry, & Hyman 1992; DeRosier, Kupersmidt, & Patterson, 1994) have shown that students who have troubled relationships with their peers later show poor school performance and higher rates of truancy. Furthermore, long-term social withdrawal negatively effects academic achievement, self-worth and psychosocial adjustment (Buhs, Herald, & Ladd, 2006) as well as compromises emotional well-being (Bukowski, Laursen, & Hoza 2010; Schwartz, Gorman, Nakamoto, & Toblin, 2005; Newcomb, Bukowski, & Pattee, 1993).

Another important social relationship within the school context is the teacher-student relationship (Wentzel, 2009a; Raufelder & Mohr, 2011). In line with the developmental

systems theory (Lerner, 1998), Nickel (1993) has conceptualized the transactional model of the teacher-student relationship. This model point to the importance of understanding the teacher-student relationship by complex processes and dynamics that regulates them. While the student-student relationship has a strong influence on students' general well-being in school (Raufelder & Mohr, 2011; Hascher, 2007), the teacher-student relationship is central to the construct of interest (e.g., Birch, & Ladd, 1996, 1997; Pianta & Nimitz, 1991) and the need for learning support (Raufelder & Mohr, 2011; Pianta, Hamre, & Stuhlman, 2003). Teachers not only instruct and provide feedback regarding students' academic performance, but also have a major impact on students' motivation to learn (Wentzel, 2009b; Becker & Luthar, 2002; Pianta, Hamre & Stuhlman, 2003; Stipek, 2004). Moreover, teachers act as role models for students and provide support from an adult other than a parent (Raufelder, 2007) as well as communicate their more general approval or disapproval for the student as a person (Birch & Ladd, 1996), which can affect students' sense of identity (Birch & Ladd 1997, 1998; Alerby & Hertting 2007; Jennings & Greenberg 2009). This research demonstrates that the teacher-student relationship – similar to peer relationships in school – is important for adolescents on three levels: (a) personal development, (b) scholastic motivation and (c) academic achievement. Based on the developmental contextualism theory, all of them must be understood as interconnected and interdependent processes. In order to enhance our understanding of these abovementioned interdependencies and considering individual differences in motivational orientations and personal development, we developed the REMO scale.

Considerations in the development of the REMO scale

The REMO scale was developed using information from both the motivation and the social relationships in school literatures. Furthermore, aspects of developmental psychology

were included in order to consider the specific developmental phase of adolescence. Based on the multi-dimensional character of motivation we focused not on any one specific aspect of motivation, but rather emphasized the interconnection between motivation and social relationships in school. Although much is known about the relationships between teacher and peer support and motivational outcomes (Wentzel, Battle, Russell, & Looney 2010; Wentzel, 1998), all existing knowledge based on quantitative research must be understood as a result of indirect measurement (i.e., the association between variables of motivation and variables of relationship). Items were developed to address the lack of existing motivation measures that incorporate both social relationships and motivation into one scale.

As mentioned, for most adolescent students positive social relationships in school promote academic motivation and achievement (Wentzel, Battle, Russell, & Looney 2010; Wentzel, 1996, 1998). In contrast, little is known about the academic motivation and achievement of adolescents who lack close friendship or social support from peers and/or teachers (Hamre & Pianta, 2006). We also developed the REMO scales to address this gap in the literature. In this sense it is an instrument that examines how students differentially rely on teachers and/or peers as sources of motivation, and is predicated on the notion that individuals learn and are motivated in different ways (Raufelder, Jagenow, Drury & Hoferichter, 2013). The purpose of this study therefore, is to report on (a) the dimensionality of REMO and (b) evidence for construct validity based on relationships of REMO with measures of students academic achievement.

2.2 Method

Participants

The participants (N = 1088) were 12 to 15 year old 7th and 8th grade students ($Mean_{age}$ = 13.7 years; SD = .53) in 23 secondary schools across 71 classrooms in Brandenburg,

Germany. Just over half (53.9%) of the students were girls (n = 587). We examined this age group because of the fact that students' motivation declines rapidly starting after the transition to secondary school and continuing throughout the first three years of high school (Harter, 1996), reaching its nadir in grade nine (Eccles, Wigfield, & Schiefele, 1998; Watt, 2004; Zusho & Pintrich, 2001). Due to the very low percentage of ethnic minorities in Brandenburg (2.6%), ethnicity data were not collected.

Procedure

Data were collected during the summer and autumn terms of 2011. For each class, data were collected on two consecutive days. Following the German guidelines regarding confidentiality and data protection, the permission to conduct the study was granted by the government department of education, youth and sport of Brandenburg. Parental permission for student participation was obtained through a process of active consent. The researchers introduced the students thoroughly to the questionnaires and given instructions on how to complete the measures. Participants were asked to complete questionnaires assessing peers as motivators (including individual learning behavior), teachers as motivators, and academic achievement motivation. Furthermore, the students were informed that participation in the study was voluntary, that all their answers would be confidential and that they were not obliged to answer any questions. The 23 participating schools were selected randomly.

REMO Scale construction

The complexities of the teacher-student relationship and the student-student relationship were examined in a six-month pilot ethnographic field study conducted in a secondary school with a group of German adolescents and teachers (Raufelder, 2007). Through participant observation, ethnographic field notes and qualitative interviews, differences in students' expectations about teachers and peers as motivators were identified.

Whereas for some students, positive feelings towards a teacher were essential to their motivation, other students' motivation was not contingent on positive feelings towards teachers; they rather appreciated the professional abilities of a teacher, such as a clear teaching style or a logical way of explaining subject matter. Furthermore, other students explained that teachers did not have a critical impact on their motivation in school. In contrast, some students reported that peers are essential for motivation as they provide a motivational orientation, i.e. setting norms for learning behavior and attitudes towards school. Still other students did not perceive their classmates as motivators and instead preferred to learn alone.

The next step in the process of developing the REMO scale was to create items that capture the complexities of the interconnection between the social relationships and motivation found in the ethnographic field study. Items were also based on a review of the literature. We consulted studies, which had measured the quality of teacher-student relationship (Battistich, Schaps, & Wilson, 2004; Birch & Ladd, 1997; Hamre & Pianta, 2001) and the student-student relationship (Hascher, 2007; Liu & Lu, 2011), as well as empirical studies of scholastic motivation and the interplay between them (Birch & Ladd, 1996; Harter, 1996; Wentzel 1998). After careful review of the literature and consideration of the field study, several differences between teacher-student and student-student relationships in terms of motivation were identified. For example, with regards the teacher-student relationship we were interested in measuring aspects such as sympathy, teachers' awareness of students abilities and interest, and teacher support, whereas we focused on learning as a shared experience, reward and attention from peers as important aspects of the student-student relationship. The two subscales of the REMO scale (Peer-REMO and Teacher-REMO) were constructed based on these differences, however, they both assess the quality and type of peer

or teacher support and measure the role of peers and teachers as both positive and negative motivators. The original scale consisted of 46 items.

Subsequently, a quantitative study was designed (Tashakkori & Teddlie, 1998). A pilot study was conducted to test the wording of the items, the order of the questions, the range of answers, as well as the reliability and normal distribution of the data. Following this pilot phase of testing, (including reliability analyses, re-test and exploratory factor analyses, see results) in 2011, the REMO scale was revised and now consists of 37 items with five subscales (peers as positive motivators, peers as negative motivators, individual learning behavior, teachers as positive motivators, and teachers as negative motivators).

Peers as motivators (P-REMO). Based on a set of initial exploratory analyses three peer subscales were identified: (1) peers as positive motivators (PPM) (9 items; e.g., "It is easier to do well in school when friends motivate me.") (α = .80), (2) peers as negative motivators (PNM) (6 items; e.g., "If my friends were not interested in school, I also would not make an effort.") (α = .73), and (3) individual learning behavior (ILB) (6 items; e.g., "I can learn better on my own as compared to when I work with others.") (α = .80). Responses were scored on a 4-point Likert-scale ranging from "strongly disagree" to "strongly agree". All the items are shown in Table 1.

Teachers as Motivators (T-REMO). In order to help students orient themselves to this section of the questionnaire, it began with the statement " Please think about your teachers in general. How much do you agree with the following statements?" Similar initial analyses were used to create two teacher subscales: (1) teachers as positive motivators (TPM) (6 items; e.g. "A teacher's enthusiasm in a subject matter motivates me to learn more.") (α = .78) and (2) teachers as negative motivators (TNM) (10 items; e.g. "When a teacher doesn't notice that I am making an effort, I stop trying.") (α = .82).

Table 1

Rotated Component Matrix for P-REMO (Varimax) & Pattern Matrix for T-REMO (Promax)

Items P-REMO	*F1*	*F2*	*F3*
Peers as Positive Motivator			
1. I like to make an effort at school because my friends then tell me that I am clever.	**.72**	-.06	.07
2. It is easier to do well in school when friends motivate me.	**.67**	-.06	-.19
3. When my friends learn, I am also motivated to learn more.	**.65**	-.01	.09
4. When my friends want to improve at school, I also want to do better.	**.64**	-.07	.03
5. I make an effort at school when my friends motivate me.	**.64**	.01	-.18
6. At school I try to make a similar effort to that of my friends.	**.60**	.07	.02
7. My friends and I motivate each other to make an effort at school.	**.58**	-.24	-.07
8. Because of my friends, I try to make more of an effort at school.	**.56**	.23	-.04
9. I will study harder for an exam when my friends tell me that they are also working hard.	**.52**	.28	-.08
Peers as Negative Motivator			
1. My friends pay me more attention when I make less of an effort at school.	.03	**.70**	.09
2. If my friends were not interested in school, I also would not make an effort.	.04	**.69**	-.02
3. My friends encourage me to spend as little time as possible on schoolwork.	-.10	**.69**	-.01
4. At times, I do not make an effort at school because my friends say that it is uncool to try.	-.03	**.67**	.03
5. If my friends were to say that good grades do not matter, I would study less.	.01	**.66**	-.09
6. When my friends find school boring, I also tend to find school tiresome.	.08	**.53**	-.11
Individual Learning Behavior			
1. I can learn better on my own as compared to when I work with others.	.02	-.04	**.84**
2. Studying for a test is easier when my friends and I work together. (-)	-.19	-.05	**.71**

3. When an exam is approaching, I prefer to study on my own.	.08	-.10	**.67**
4. I never do my homework with friends, I always do it on my own.	.02	-.02	**.66**
5. It is easier to succeed at school when you work on your own rather than with others.	.02	.07	**.66**
6. I learn best when I work together with my friends. (-)	-.24	-.00	**.64**

Items T-REMO	*F1*	*F2*
Teacher as Positive Motivators		
1. When a teacher helps me, I try to do well in the subject.	**.74**	.14
2. When a teacher takes her/his time to explain something to me, I will make more effort the next time.	**.71**	.09
3. When a teacher notices that I have tried my best, I will try to give my best again in the future.	**.71**	-.01
4. I will make more of an effort in a subject when I think the teacher believes in me.	**.68**	.29
5. A teacher's enthusiasm in a subject matter motivates me to learn more.	**.65**	.12
6. When a teacher likes me, I make more effort in the subject.	**.64**	.41
Teacher as Negative Motivator		
1. When I do not like a teacher, I am not interested in the subject.	.15	**.75**
2. When I think the teacher does not believe in me, I don´t make an effort to do well.	.11	**.67**
3. When I don´t like a teacher, I get tired of the subject.	.17	**.62**
4. When a teacher doesn´t notice that I am making an effort, I stop trying.	.12	**.62**
5. If a teacher never gives me a good grade in a subject, I stop caring about how I do in that subject.	-.06	**.61**
6. When a teacher does not try to help me, I usually give up.	.15	**.61**
7. Whether I like or dislike a teacher has influence on how much I learn.	.19	**.61**
8. When I think a teacher does not like me, I have trouble being inspired by the subject.	.40	**.56**
9. When a teacher bores me, I do not learn anything at all.	.06	**.56**

10. When a teacher is not interested, I cannot be interested.	.36	**.55**

Note. Factor loadings > .40 are in boldface. P-REMO = Peer-Relationships and Motivation; T-REMO = Teacher-Relationships and Motivation.

Measures

Motivation.

To assess academic achievement we used two established scales that are intended to measure different aspects of motivation

Academic Achievement Motivation. Student's *Achievement Drive* was assessed using a scale (8 items) from the *Achievement Motivation Questionnaire for Students 7th to 13th grade* (Petermann & Winkel, 2007). Students were asked about different aspects of their drive for achievement (e.g., "In school I want to be one of the best"; "I prefer to work on tasks, which are really challenge me"). Items ranged from 1-5 (1= "it is not true at all" to 5 = "it is totally true") (α = .82).

Learning and Achievement Motivation. These constructs were measured using the Learning and Achievement Scale (Spinath, Stiensmeier-Pelster, Schoene, & Dickhaeuser, 2002) composed of 4 subscales: learning goals, striving for academic success, avoidance of academic failure and work avoidance. *Learning Goals* consisted of 8 items (e.g., "In school I want to learn interesting things in school" or "In school I want to understand complicated subject matter"). (α = .83). *Striving for Academic Success* consisted of 7 items (e.g., "In school I want to get better grades than the others" or "In school I want to demonstrate what I know and what I can do"). (α = .81). *Avoidance of Academic Failure* consisted of 8 items (e.g., "In school I want to hide my lack of knowledge" or "In school I don't want to look

stupid by asking stupid questions"). (α = .80). All items in the scale ranged from 1-4 (1 = "it is not true at all" to 4 = "it is totally true"). *Work Avoidance* consisted of 8 items (e.g., "In school I want to keep effort small") (α = .76).

2.3 Results

Factor Analyses

A three-stage approach was used to explore the factor structure underlying the 37 REMO items. Although we had a hypothesized factor structure, we opted for a particularly stringent approach to assessing the presence of the expected three- and two-factor models, and began with an exploratory factor analysis. We then followed these exploratory analyses with confirmatory factor analyses, which was confirmed by multilevel confirmatory factor analyses.

We first employed oblique (i.e., promax) rotations on both the peer and teacher items in order to test for interdependence between the factors. The following criteria were used to determine the number of factors to retain: (a) eigenvalues of the unrotated factors ≥ 1, (b) Cattell's scree test, (c) Monte Carlo parallel analysis (R Package nFactors, Raiche & Magis, 2010) (d) variance accounted for by unrotated factors $\geq 5\%$ to reduce the risk of extracting too many minor factors, (e) internally reliable factors, and (f) factors that yield meaningful psychological constructs. The internal consistency reliability (Cronbach's Alpha and the split half reliability) of the scores as well as the re-test reliability also was examined (see Table 2). The re-test reliability was statistically satisfying. According to Little (in press), the focus on test-retest assessments as indices of reliability is insensitive to the presence of change: the test-retest correlations captures only stability information and the effort to maximize this

stability in the development phase of a measure undermines the usefulness of the measure for identifying and modeling change processes.

Table 2

Test Criteria of REMO

Subscale	Number of items	Example	α	Split-half Reliability	Re-test Reliability
PPM	09	My friends motivate me to make an effort at school.	.80	.78	.70
PNM	06	When my friends find school boring, I also tend to find school tiresome.	.73	.75	.71
ILB	06	I can learn better on my own as compared to when I work with others.	.80	.79	.78
TPM	06	A teacher's enthusiasm in a subject matter motivates me to learn more.	.78	.81	.75
TNM	10	When I think the teacher does not believe in me, I don´t make an effort to do well.	.82	.81	.81

Note. N=1088, PPM = Peers as Positive Motivator; PNM = Peers as Negative Motivator; ILB = Individual Learning Behavior; TPM = Teacher as Positive Motivator; TNM = Teacher as Negative Motivator.

Peer Analysis (P-REMO). A three-factor structure, with k = 3, best met the criteria (outlined above) for an adequate factor analytic solution. The component correlation matrix from the oblique rotation suggested independence between the factors and as such an orthogonal (varimax) rotation was conducted (Child, 2006). We found that ILB was weakly correlated with PPM ($r = –0.19$), but not with PNM ($r = –0.09$). PPM and PNM were not correlated ($r = 0.06$).

The varimax rotation of the factors produced a nearly identical solution and 21 items with factor loadings ≥ .30 were retained following these initial procedures. This decision was based on the rationale that factor loadings of 0.30 or greater are acceptable in exploratory factor analysis after factors have been rotated (Nunnally, 1978). We eliminated 6 items, which loaded weakly on one factor (<.30) and/or loaded on several factors. The varimax rotation produced the same solution that appeared to represent the three-factor (PPM, PNM and ILB) structure proposed in this study. Specifically, 9 items with factor loadings ranging from 0.52 to 0.72 loaded on Factor I (16.18% explained variance). All these items had been hypothesized to represent the PPM dimension. Six items with factor loadings ranging from 0.53 to 0.70 loaded on Factor II (10.96% explained variance). This factor was labeled PNM and included all the items hypothesized to represent this dimension. Six items with factor loadings ranging from 0.64 to 0.84 loaded on Factor III (10.22% explained variance). In addition, two items were recoded ("I can learn better when I do it with my friends"; "Studying for a test is easier when I do it with my friends") to load positively on Factor III. This factor was labeled ILB and again, all these items had been hypothesized to represent the ILB dimension. The rotated component matrix (varimax-rotated solution) is presented in Table 1. The distinct contribution of each factor to each variable can be assessed through examination of this matrix, which shows the standardized regression coefficients.

Teacher Analysis (T-REMO). A two-factor structure, with k = 2, best met the criteria for an adequate factor analytic solution and 16 items with factor loadings >.40. We eliminated 3 items, which loaded weak on one factor (< .40) and/or loaded on several factors. The component correlation matrix from the oblique rotation suggested interdependence between the two components TPM and TNM (r = 0.26), and as such the promax-rotation solution is reported. The solution appeared to represent the two-factor (TPM) and TNM) structure

proposed in this study. Specifically, 6 items with factor loadings ranging from 0.64 to 0.74 loaded on Factor I (26.33% explained variance). This factor was labeled TPM. Ten items with factor loadings ranging from 0.55 to 0.75 loaded on Factor II (14.67% explained variance). This factor was labeled TNM. All items fell within their hypothesized dimensions. The factor pattern matrix (promax-rotated solution) is presented in Table 1. The distinct contribution of each factor to each variable can be assessed through examination of this matrix, which shows the standardized regression coefficients.

Structural Equation Modeling/Confirmatory Factor Analysis. The second stage of our analyses employed confirmatory procedures. Our goal was to use a hypothesis testing approach to assess the validity of our two and three factor models. Prior to conducting structural equation modeling, parcels were built from the factor items determined by the factor analysis. 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 our peer factors, items were randomly assigned to parcels**.** The PPM (9 items), PNM (6 items), and ILB (6 items) factors all consisted of 3 parcels. Contrariwise, the teacher factors are not unidimensional and as such were assigned to parcels based on factor analysis the TPM (6 items) and TNM (10 items) factors consisted of 3 parcels each.

Two separate structural equation models were run (using Mplus 6.12; Muthén & Muthén, 1998-2010), one for the peer items and one for the teacher items, in order to confirm our five latent factors**:** Peers as Positive Motivators, Peers as Negative Motivators, Individual

Learning Behavior, Teachers as Positive Motivators, and Teachers as Negative Motivators. Each factor was set as a covariate of every other factor. The latent factor model for the peer items reached a good fit ($\chi 2_{(24)} = 93.59$, $p < 0.001$, $CFI = 0.97$, $RMSEA = .05$, $SRMR = .04$) (see Figure 1).

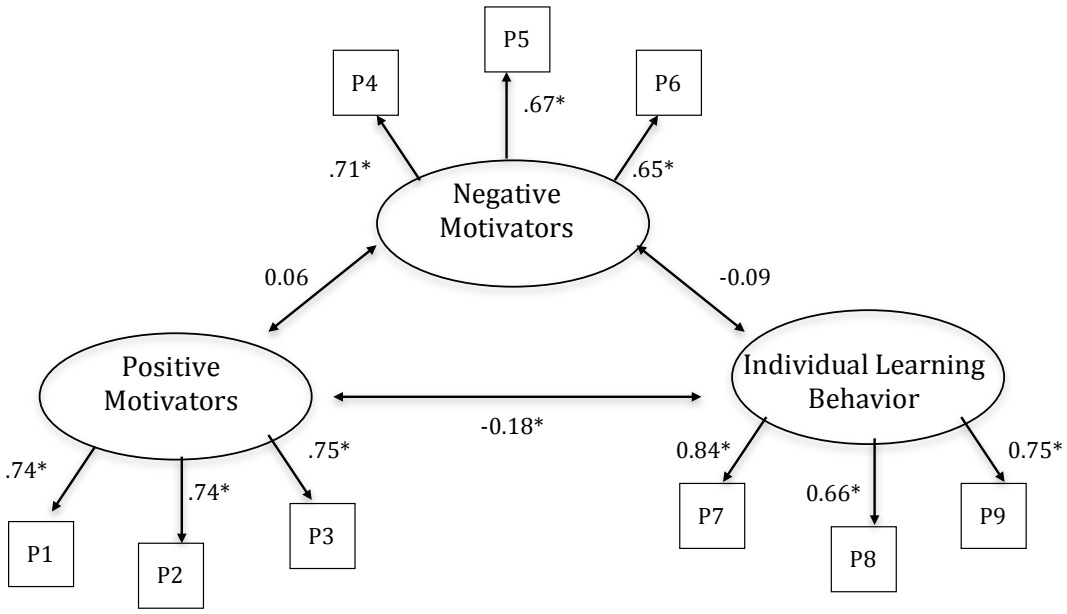

Figure 1. Confirmatory Structural Equation Model for the Peer items. Significant effects ($p < .05$) shown as standardized coefficients (betas) are noted with the symbol (*).

The latent factor model for the teacher items also reached a good fit ($\chi 2_{(7)} = 5.73$, $p = .08$, $CFI = 1.00$, $RMSEA = .00$, $SRMR = .01$) (See Figure 2).

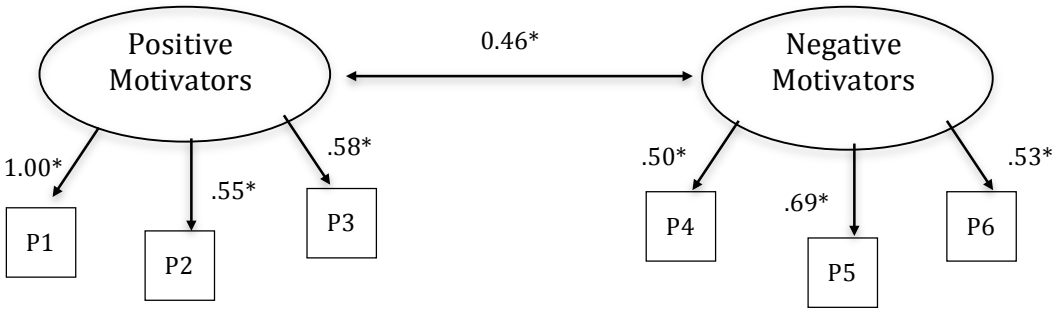

Figure 2. Confirmatory Structural Equation Model for the Teacher items. Significant effects ($p < .05$) shown as standardized coefficients (betas) are noted with the symbol (*).

We conducted SEMs accounting for nesting in classes using the approach proposed by Asparouhov (2005) for complex survey data. This approach corrects for standard error biases created by the nested nature (students/class) of our data.

By examing the confidence intervals (CI's) of the paired correlations among the latent variables, we tested for discriminant validity. If the confidence interval of the paired correlation does not include the value of 1, it is evidence for discriminant validity (Torkzadeh, Koufteros, & Pflughoeft, 2003). We computed the 95 % confidence interval for the correlations between the latent Peer-REMO variables and the Teacher-REMO variables: (1) PPM and PNM (*CI* .00, .02), PPM and ILB (*CI* –.09, –.03), PPN and ILB (*CI* –.05, –.01) and (2) TPM and TNM (*CI* .05, .09). In addition, the above-mentioned correlation values were low, which provides further support for discriminant validity (Torkzadeh, Koufteros, & Pflughoeft, 2003).

Multilevel Confirmatory Factor Analysis. The final step in our analyses involved two multilevel confirmatory factor analyses (MCFA), which were run using Mplus. Prior to conducting the MCFA, the variability between and within classes on each parcel was examined by computing the intraclass correlations (ICCs) for each of the 9 parcels from P-REMO and the 6 parcels from the T-REMO. The ICCs of the parcels were low for the P-REMO (.006 – .096) as well as the T-REMO (.021 – .055). These values indicated that there was low between-class variability. According to Dyer, Hanges and Hall (2005) and Hox (2002) most MCFA were conducted if ICCs were greater than .10. Nevertheless, we conducted a MCFA with an unrestricted model on level 2 (class) since we had no hypotheses on the contextual level. Results of the two-level models (P-REMO, T-REMO) show a reasonable and almost similar fit of the previous model (i.e., the SEM-CFA complex approach) to the data: (1) P-REMO: The RMSEA of .05 and CFI of .98 indicated acceptable fit overall. The SRMR fit indices at each level indicated that the fit of the Level 1 (within) part of the model was better than at Level 2 or between (SRMR within = .04 vs. SRMR between .05). (2) T-REMO: The RMSEA of .00 and CFI of 1.00 indicated a good fit overall. The SRMR fit indices at each level indicated that the fit of the Level 1 (within) part of the model was better than at Level 2 or between (SRMR within = .01 vs. SRMR between .02).

Correlations between student's responses on REMO and independent measures of academic achievement and motivation. Demonstrating the construct validity of a new scale requires assessing its discriminant and convergent validity by investigating whether the pattern of correlations of the focal concept with measures of similar and or related constructs (Campbell, Trapnell, Heine, Katz, Lavallee, & Lehman, 1996). Therefore, in order to establish convergent validity of the scale, student's scores on the REMO subscales were correlated with the independent measures of motivation. Table 3 contains all correlations, as

well as mean values and standard errors. Scores on the P-REMO subscale PPM were significantly associated with standardized scales of academic achievement motivation and achievement learning motivation. The strength of these correlations suggests a strong conceptual overlap between the scales and therefore provides evidence of convergent validity. For example PPM was significantly correlated with Academic Drive (AD) (r = 0.29) and Learning Goals (LG) (r = 0.27). Whereas the subscale Work Avoidance (WA) was not associated with PPM, there was a significant correlation between PNM and WA (r = 0.33). The more students perceive their peers as negative motivators, the more they tend to avoid doing work for school. PNM had consistently significant negative associations with motivation and academic achievement subscales, such as AD (r = –0.17) and LG (r = –0.32). Interestingly, Avoidance of Academic Failure (AAF) was positive associated with PNM (r = .016) and PPM (r = 0.19), and uncorrelated with ILB (r = 0.04), meaning that, peer dependent learners, independent of whether peers act as positive or negative motivators, do not want to "loose their face" and try to avoid academic failure. The ILB subscale was weakly (when taking sample size into account) correlated with measures of academic achievement and motivation.

The subscale TPM of the T-REMO was positively correlated with motivation and academic achievement scales, such as AD (r = 0.34), LG (r = 0.27) and Striving for Academic Success (SAS) (r = 0.32). In contrast, the subscale TNM was negatively associated with AD (r = –0.13) and LG (r = –0.26), as well as positively related to AAF (r = 0.21) and WA (r = 0.34).

Table 3: *Means, standard deviations, and intercorrelations between REMO subscales and independent measures of motivation and academic achievement.*

Measure	2	3	4	5	6	7	8	9	10	M	SD
1. PPM	.045	-.14**	.41**	.09**	.29**	.27**	.27**	.19**	.03	2.55	.51
2. PNM	–	-.07*	-.09**	.37**	-.17**	-.32**	-.13**	.16**	.33**	1.54	.43
3. ILB		–	.02	-.09**	.12**	.10**	.13**	.04	-.06*	2.68	.64
4. TPM			–	.26**	.34**	.35**	.32**	.15**	-.02	3.08	.50
5. TNM				–	-13**	-.26**	-.05	.21**	.34**	2.42	.54
6. AD					–	.45**	.59**	.13**	-.11**	3.13	.71
7. LG						–	.54**	.045	-.20**	2.96	.51
8. SAS							–	-.38**	.09**	2.68	.52
9. AAF								–	.48**	2.31	.52
10.WA									–	2.33	.54

Note. All measures are standardized. PPM = Peers as Positive Motivator; PNM = Peers as Negative Motivator; ILB = Individual Learning Behavior; TPM = Teacher as Positive Motivator; TNM = Teacher as Negative Motivator; AD = Academic Drive; LG = Learning Goals; SAS = striving for academic success; AAF = avoidance of academic failure; WA = Work Avoidance, TSR = Teacher-Student Relationships; SSR = Student-Student Relationship; *$p < .05$, ** $p < .01$.

2.4 Discussion

This study provides information on the development of the Relationships and Motivation Scale, a measure of adolescent students' perceptions of their relationship with their peers (P-REMO) and teachers (T-REMO) as sources of motivation. Developmental contextualism (Lerner, 1998) as well as findings from empirical studies highlight the need to measure the role of peers and teachers in student's scholastic motivation concomitantly, meaning in a single measure. We examined not only the dimensionality and internal consistency of REMO but also its associations with other measures of academic achievement motivation. Given the literature on the differential motivational significance of social relationships in school, our study also explored questions related to this topic.

REMO dimensionality

The findings suggest that REMO elicits reliable and meaningful information from students in adolescence about their experiences of peers and teachers as motivators. Factor analyses supported a two-factor solution for the teacher items and a three-factor solution for the peer items, with acceptable internal consistency, and along hypothesized conceptual dimensions. Three peer factors, Peers as Positive Motivators (PPM), Peers as Negative Motivators (PNM), and Individual Learning Behavior" (ILB) and the two teacher factors Teachers as Positive Motivators (TPM) and Teachers as Negative Motivators (TNM) emerged from the analysis of student's self-reports. These factors were developed based on a theoretical framework and are part of a larger research agenda which also explores the roles of peers and teachers as sources of negative motivation, as well as the characteristics of students who show consistent motivation and academic achievement independent of social relationships with peers and teachers.

One of the interesting findings from our study is the absence of statistically significant correlation between the subscales PPM and PNM. Our results show that students distinguish between the positive and negative influences of their peers as motivators, suggesting different underlying constructs. A possible explanation for this difference might be the low mean level of reported negative influences of peers, which is perhaps an artifact of social desirability. In other words, students may want to appear socially competent and as such were inclined not to report negatively about their peers; in turn this low response rate would cause the correlation not to reach statistical significance. Alternately, it is conceivable that the nature of peer relationships is such that an adolescent's self-selected peer affiliations are generally sources of either positive *or* negative motivation making these constructs statistically independent. By contrast, the externally assigned teacher-student relationship is often characterized by *both* positive and negative aspects of motivation. In line with this view, the teacher subscales are highly correlated, which underlines the role of teachers as more general motivators (positive and negative) perhaps due to the more formal, assigned and institutional nature of the relationship. Furthermore, students with high scores on PPM tend to perceive their teachers also as positive (TPM), such as students with high scores on PNM tend to perceive their teachers also negative motivators (TNM).

The subscale Independent Learning Behavior (ILB) was constructed as a control condition for the peers and teacher variables based on the idea that there are students for whom peers and teachers do *not* play a key role in academic achievement motivation and achievement goal orientation (see Raufelder, Jagenow, Drury, & Hoferichter, 2013). Indeed, scores on ILB were weakly negatively associated with PPM, PNM and TNM, and were no significant associations between ILB and TPM, as well as between ILB and "avoidance of academic failure" (AAF). These findings suggest that the motivation and learning behavior of

students with high scores on ILB tends to be independent from both peer and teacher influences.

REMO and external variables of academic achievement motivation and achievement goal orientation

The most salient of the findings concerns the consistent associations between the quality of the peer- and teacher-relationships and academic achievement motivation and achievement goal orientation. Students who perceive peers and teacher as positive motivators tended to have higher scores on achievement drive, learning goals, striving for academic success and avoidance of academic failure. In light of current findings in motivation research, our investigation supports the claim that for many adolescent students, positive social relationships in school support academic achievement motivation and achievement goal orientation (Wentzel et al. 2010; Wentzel, 1998). In contrast, students who perceive their peers and teachers as negative motivators tended to endorse negative attitudes about academic achievement motivation and achievement goal orientation. Finally, students who would rather learn alone, tend to not need peers or teachers as motivators, and do not avoid academic failure. These findings can be understood as an explanation for the partly contradictory results of motivation research, which on the one hand indicate that social relationships and the emotions one experiences within social relationships are important predictors of academic achievement (Klem & Connell, 2004; Lee & Smith, 1999; Wentzel, 1998) and on the other hand, reveals that some students' school achievement is constant (good or bad) and not dependent on teachers or classmates (Ryan & Deci, 2000a).

Strengths, Limitations and Future Directions

Like other studies this project may have some methodological limitations that merit consideration when interpreting the current findings. Firstly, the study is reliant on self-report

measures. However, most researchers who have included teacher- and self- reports similar to the supports and motivation outcomes assessed in this study have reported low levels of concordance between information provided by multiple informants (see Skinner & Belmont, 1993). Therefore, there is evidence to suggest that teachers do not provide valid information concerning how students perceive their motivation. In addition, given our focus on students' subjective experiences of teachers and peers as motivators, a self-report strategy is warranted. However, future research that documents reliable connections between students' perceptions, and teacher and peer classroom behavior would extend our understanding of student motivation in important ways (Wentzel, Battle, Russell & Looney, 2010). Secondly, until now, the sample consists only of students aged between 12 and 15 years. Finally, the data are cross-sectional, which limits attributions about the stability/flexibility of social relationships and scholastic motivation over time.

From the standpoint of basic psychological research, there is a need for future research examining different age groups and collecting additional data from teachers and parents. As is true with the development of any new scale, there is a need for ongoing validation of the REMO scales. Therefore, in future research we will test REMO with the same sample in a second wave 2013, so that a longitudinal verification will be existent. Furthermore, qualitative interviews and fMRI studies with a sub-sample (80 students of 1088) will be conducted in 2012 to complement the self-report measures and validate the quantitative data.

In conclusion, it appears that the REMO provides a robust assessment of a student's experience of peers and teachers as motivators in the school context. The use of these scales circumvents problems associated with indirect measurement of social relationships and motivation and considers different subgroups of children, such as those children for whom peers are essential for their scholastic motivation, as compared to those for whom teachers are

more important. We propose that there will be also students for whom both peers and teachers are important, as well as students for whom neither peers nor teachers are of any consequence for their scholastic motivation. As such, the REMO has the potential to inform both theory and practice in motivation research and school psychology.

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CHAPTER 3

STUDY II:

Social Relationships and Motivation in Secondary School: Four Different Motivation Types

Abstract

In order to enhance our understanding of individual differences in scholastic motivation, the present study examined if social relationships in school are equally important for motivation across a large sample of adolescent students. Based on past research as well as our preliminary findings, it was hypothesized that there would be 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. Self-report data of 1088 seventh and eighth-grade students' perception of social relationships and scholastic motivation were used to test our model of four different motivation types. Confirmatory latent class analysis (CLCA) was conducted. In line with our hypothesis, the results of the CLCA confirmed our 4 latent class model. The findings indicate the relevancy of the typology. The findings could be integral to the creation of learning programs that support students on a more individualized level.

Keywords: motivation, social relationships, teacher support, peer support, confirmatory latent class analysis.

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3.1 Interindividual Differences in Social Relationships and Motivation

Researchers and educators alike are concerned with the problems of declining scholastic motivation and achievement, increasing student alienation and elevated rates of high school drop out (Ladd, Herald-Brown, & Kochel, 2009). These negative outcomes within the current education system of Western societies have spurred an effort to understand why some children are more motivated than others. However, despite the scientific and educational consensus about the crucial role of motivation in academic success, motivation remains is an elusive concept (Leo & Galloway, 1996; Waugh, 2002), meaning that the extent to which current approaches in the study of motivation can actually help teachers to clarify and operationalize the concept of motivation is discouraging. We do know from the ever-developing body of research on human motivation that motivation is a multi-dimensional construct resulting from interdependencies between and amongst many variables (Weiner, 1990; for overview see Waugh, 2002). A variety of models and theoretical approaches have been developed over the past few decades, each focusing on specific dimensions of motivation, but as of yet there are no theoretical approaches that capture the complexity of the construct (Leo & Galloway, 1996). Furthermore, beyond the need for further clarification of the construct, individual differences in motivational processes have been largely overlooked in research agendas.

Individual Differences in Motivation Patterns

The level of children's motivation changes as they move through adolescence (Wentzel, 2009b). Over the school years, the scholastic motivation of many children

decreases due to changes both in themselves and in the school environment they experience (Wigfield & Eccles, 2001; Eccles & Midgley, 1990; Wigfield, Eccles, & Rodriguez, 1998; Stipek, 1996). For some students, these changes lead to withdraw from achievement situations and avoidance of such opportunities whenever possible. For others, however, these changes in self and environment are not necessarily associated with detrimental outcomes (Wigfield & Eccles, 2001). These findings are in contrast with other motivation research, which suggests that some students' school achievement remains constant across their school years (Deci & Ryan, 2000), independent of changes in themselves or in the social environment. In other words, they show constant school achievement and therefore seemingly constant motivation to learn, independent of the teachers who instruct them and the classmates who surround them. Taken together, these divergent findings suggest the presence of individual differences in motivation patterns as well as in the roles played by peers and teachers in students' motivation.

With the current interest in learning and motivation, the role of social and emotional factors in the school context is being re-examined (Goleman, 2004). School is not only the environment in which students experience academic achievement, it is also a place of socio-emotional development where a significant portion of their childhood and adolescence is spent. Accordingly, the classroom setting functions not only as an educational arena, but also as a powerful social learning context (Harter, 1996). Considering the increasingly complex nature of social relationships during adolescence, both the student-student relationship and the teacher-student relationship become essential to healthy personal development and socialization (Erikson, 1959; Wentzel, 2009b), as well as for motivational processes (Wentzel et al., 2010; Wentzel, 2005; Harter, 1996) and academic achievement (Flanagan, Erath, & Bierman, 2008; Raufelder & Mohr, 2011; Wentzel, 1998).

Peers and Teachers as Motivators

As recent studies have shown, motivation can be enhanced or undermined by social factors (for reviews, see Deci & Ryan, 1985; Reeve, Deci, & Ryan, 2004). Classmates serve as potential companions and friends and as such fulfill important social needs of the developing child (Harter, 1996; Rubin, Bukowski, & Laursen, 2009; Rubin, Bukowski, & Parker, 2006). Several studies have examined peer relationships as an important context for social engagement and scholastic motivation (Ladd, Herald-Brown, & Kochel, 2009; Juvonen & Wentzel, 1996; Wentzel, 2005, 2009a; Wentzel et al., 2010). Wide-ranging positive and negative effects on academic performance and on one's sense of belonging and adjustment were identified. Longitudinal studies have showed that students who have troubled relationships with their peers (e.g. experience peer rejection) later show poor school performance and truancy (e.g., Ollendick, Weist, Borden, & Greene, 1992; Coie, Lochman, Terry, & Hyman 1992; DeRosier, Kupersmidt, & Patterson, 1994). In contrast, positive friendships appear to influence different dimensions of school adjustment (Berndt, 1999), such as well-being, attitudes towards school, and motivation. Past research suggests that academic motivation may be partially socialized within peer networks. For example, results of Kindermann's longitudinal study (1993) showed that over the course of a school year the motivational orientation of the peer group influences individual changes in motivation, suggesting that such self-selected peer affiliations may enhance or decrease students' motivation in school (Hymel, Comfort, Schonert-Reichl, & McDougall, 1996).

Another important type of social relationship within this context is the teacher-student relationship, which has been shown to especially affect well-being in school in so far as teachers act as role models for students and provide support from an adult other than a parent (Harter, 1996; Wentzel, 2009b). What students learn and how well they do in school is the

product of a complex dynamic of educational practices (e.g. teaching styles), and student (Hodis, Meyer, McClure, Weir, & Walkey, 2011) and teacher characteristics, including multiple social, cognitive, and emotional variables (Nickel, 1981). Not only do teachers convey approval or disapproval for scholastic achievement, they also communicate their general approval or disapproval for the child as a person (e.g., Harter, 1996; Birch & Ladd, 1996; Wentzel, 2009b, 1996). Autonomy-supportive or student-centered teaching behaviors affect students' intrinsic motivation, class participation (e.g., Radel, Sarrazin, Legrain, & Wild, 2010; Roth, Assor, Kanat-Maymon, & Kaplan, 2007; Soenens & Vansteenkiste, 2005) and academic achievement through their positive influence on school-related values, interest and performance goal orientation (Goodenow, 1993; Ibanez, Kuperminc, Jurkovic, & Perilla, 2004; Murdock & Miller, 2003; Eccles & Roeser, 1999; Valeski & Stipek, 2001, Wentzel, 1997,1998, 2003). In contrast, controlling teaching behaviors such as giving a lack of choice in the classroom, assigning boring tasks, and providing low teacher support leads to student disengagement and withdrawal, and an undermining of motivation (Roeser & Eccles, 1998; Skinner & Belmont, 1993). In conclusion, a large body of research provides strong evidence for the roles of peers and teachers in students' motivation. However, based on preliminary research, the question emerges as to whether there are individual differences within these processes.

Preliminary Research

The complexities of the teacher-student relationship and the student-student relationship were examined in a six-month pilot ethnographic field study conducted in a secondary school with a group of German adolescents and teachers (Raufelder, 2007). Through participant observation, ethnographic field notes and qualitative interviews, differences in students' expectations about teachers and peers as motivators were identified.

Whereas for some students positive feelings towards a teacher were essential to their motivation, other students' motivation was not contingent on positive feelings towards their teachers; rather, they appreciated the professional abilities of a teacher, such as a clear teaching style or a logical way of explaining subject matter. Furthermore, other students explained that teachers did not have a critical impact on their motivation in school, i.e. they did not rely on the teacher as a source of motivation. In contrast, some students reported that peers are essential for motivation as they provide a motivational orientation, i.e. the peer group sets norms for learning behavior and attitudes towards school. While other students did not perceive their classmates as motivators and instead preferred to learn alone. These diverse findings require a more detailed analysis of the role played by teachers and peers for scholastic motivation considering interindividual differences.

Research Aims

The purpose of the present study was to examine individual differences in the roles played by peers and teachers in determining students' motivation, predicated on the idea of a typology of four different motivation types, which was based on the results of preliminary ethnographic work (Raufelder, 2007). Most studies on motivation and social relationships (e.g., Wentzel, Battle, Russell, & Looney, 2010; Radel, Sarrazin, Legrain, & Wild, 2010) focus on *how* social support and relationships influence motivation and school achievement. The present study sought to test an underlying assumption of this research question, namely that all students perceive these processes in the same way. In order to enhance our understanding of individual differences in scholastic motivation, we are examining if social relationships influence adolescent students' motivation *in general*. In other words, do social relationships have equal importance for all students' motivational processes, or are there

different motivational types? For example, some students may not need any or may need limited social support from teachers and/or classmates to be motivated.

In summary, it was hypothesized that four different motivation types (MT) would be identified: (1) teacher-dependent MT, (2) peer-dependent MT, (3) teacher- and peer-dependent MT, (4) teacher- and peer-independent MT.

3.2 Method

Participants

Participants in this study were seventh- and eighth-grade students (N = 1088) aged 12-15 ($Mean_{age}$ = 13.7 years; SD = .53) from secondary schools in the state of Brandenburg, Germany. Information about socio-economic status is not available due to German laws that prohibit asking a first party for information about a second party (e.g. asking students about the income of their parents). The 23 participating schools were selected randomly from a pool of 124 secondary schools in Brandenburg. We examined this age group because of the fact that students' motivation begins to decline rapidly starting after the transition to secondary school and continuing throughout the first three years of high school (Harter, 1996), reaching its nadir in grade nine (Eccles, Wigfield, & Schiefele, 1998; Watt, 2004; Zusho & Pintrich, 2001). Approximately 53.9% of the students were girls (n = 587) and 46.1% boys (n = 502). Due to the very low percentage of ethnic minorities in Brandenburg (2.6%), ethnicity data was not collected. Participants were asked to complete questionnaires assessing peer motivation, teacher motivation, and scholastic motivation.

Procedure

Data were gathered on two consecutive days during regular class time in late spring and early summer. In Germany, the collection of data in schools has to be approved by the

government. Permission to conduct the study was granted by the governmental Department of Education, Youth and Sport of Brandenburg. Following this approval, parental permission for student participation was obtained. The students were thoroughly introduced to the questionnaires and given instructions on how to complete the measures, in particular, on the use of Likert scales. The researchers informed the students that participation in the study was voluntary, that all of their answers would remain confidential and that they were not obliged to answer any questions.

Measures

Peers and teachers as motivators. A recently developed questionnaire was administered: The Relationship and Motivation (REMO) scales, self-report measures tapping participants' perceptions of peers (P-REMO: 21 items) and teachers (T-REMO: 16 items) as motivators (Raufelder, Druy, Jagenow, Hoferichter, & Bukowski, 2013). REMO was developed using information from both the motivation and social relationships in school literatures. In addition, aspects of developmental psychology were included in order to consider the specific developmental phase of adolescence. In order to take into account the multi-dimensional character of motivation, we did not focus on one specific aspect of motivation, but rather emphasized the interconnection between the various aspects of motivation (such as awareness of students' abilities and interest, teaching style, sympathy).

After a series of pilot studies, exploratory factor analyses and confirmatory structural equation modeling, the REMO scale consists of 37 items, and five subscales (peers as positive motivators, peers as negative motivators, individual learning behavior, teachers as positive motivators, and teachers as negative motivators).[2]

[2] The current study used the two subscales that measure *positive* motivation because we feel that information about the presence rather than the absence of motivation can more effectively identify individual motivation patterns.

The two scales we used for the present analyses were: (1) peers as positive motivators (PPM) (9 items; e.g., "My friends motivate me to make an effort at school."; "It is easier to do well in school when friends motivate me.") (Cronbach's $\alpha = .80$), (2) teachers as positive motivators (TPM) (6 items; e.g., "A teacher's enthusiasm in a subject matter motivates me to learn more."; "When a teacher notices that I have tried my best, I will try to give my best again in the future.") (Cronbach's $\alpha = .78$). Responses were scored on a bimodal 4-point Likert scale (strongly disagree/disagree and agree/strongly agree). To demonstrate the REMO scale's convergent and discriminant validity, the concept was correlated with a variety of independent measures (see Campbell et al., 1996) as shown in table 1.

Motivation.

Academic achievement motivation. Student's *Achievement Drive* was assessed using a subscale (8 items) from the *Achievement Motivation Questionnaire for Students 7th to 13th grade* (Winkel & Petermann, 2007). Students were asked about different aspects of their drive for achievement (e.g., "In school I want to be one of the best students."; "I prefer to work on tasks which are challenging for me."). Items are rated on a 5-point Likert scale (1= "it is not true at all" to 5 = "it is totally true"), ($\alpha = .82$).

Learning and achievement motivation. These constructs were measured using the Learning and Achievement Scale (Spinath et al., 2002). The original scale consists of four subscales, but for the purpose of the present study only three were relevant: learning goals, performance approach goals and performance avoidance goals. *Learning Goals* was comprised of 8 items (e.g., "In school I want to learn something interesting." or "In school I want to understand difficult things."), ($\alpha = .83$). *Striving for Academic Success* was measured

with 7 items (e.g., “In school I want to get better grades than others” or “In school I want to demonstrate what I can do and know.”), (α = .81). *Avoidance of Academic Failure* consisted of 8 items (e.g., “In school I want to hide when I know less than others” or “In school I don’t want to embarrass myself, e.g. by wrong answers or stupid questions.”), (α = .80). All items in the scale were built on a 4-point Likert scale (1 = “it is not true at all” to 4 = “it is totally true”).

Statistical Analyses

Confirmatory Latent Class Analysis (CLCA). Latent Class Analysis (LCA) (Lazarsfeld & Henry, 1968) is most commonly used in an exploratory manner when there is no strong a priori hypothesis regarding the number or nature of the latent classes underlying the data (Hoijtink, 2001; Laudy, Boom, & Hoijtink, 2005). In such cases, several proposed models can be fit to the data, each differentiated by the number of latent classes. The resulting fit indexes can then be compared to determine which model corresponds best to the observed data. Exploratory LCA may be considered inefficient, as it does not incorporate prior knowledge and preliminary studies. It can be very limiting when much is already known about the variables and population under question. An alternative approach to latent class modeling that allows for the formulation of specific hypotheses regarding the nature and number of latent classes in the data is the confirmatory latent class analysis (CLCA) (Finch & Bronk, 2011). CLCA provides a tool for modeling and testing specific hypotheses about response patterns in the observed variables. These hypotheses are expressed as a set of parameter constraints for an estimated LCA model (Croon, 1990). McCutcheon (2002) describes three types of parameter constraints that can be used in CLCA modeling: (a) equality restrictions, (b) deterministic restrictions, and (c) inequality restrictions. In the present study we used deterministic model restrictions to test whether conditional response

probabilities equal some specific value, 0 or 1, for the four expected latent classes (McCutcheon, 2002) (see Fig. 1).

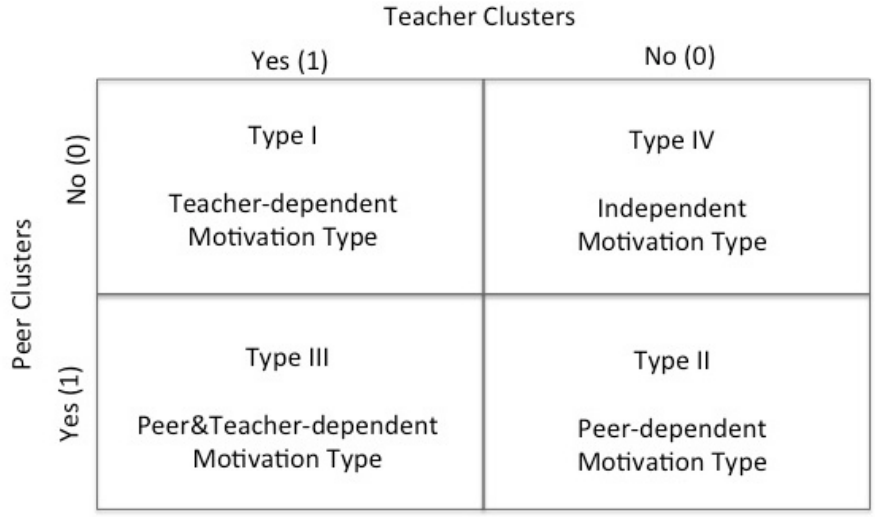

Figure 1. Deterministic Model Restriction: Hypothesized Response Patterns for the Four-Class Confirmatory Latent Class Analysis Model of Social Relationships and Motivation.

Parameter estimation for CLCA. Prior to conducting CLCA, parcels were built from the PPM and TPM items determined by exploratory factor analysis and a confirmatory structural equation model (Raufelder, Drury, Jagenow, Hoferichter, & Bukowski, 2013). According to Little, Cunningham, Shahar and Widaman (2002) there are 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. To take into account these benefits as well as the independence of our peer factors, items were randomly assigned to parcels**.** The 9 items from PPM were transformed into 3 parcels. Contrariwise, the teacher factors are not independent and as such the 3 parcels were

built based on a factor analysis of the 6 TPM items (Raufelder, Drury, Jagenow, Hoferichter, & Bukowski, 2013).

To prepare for the CLCA and in accordance with Finch and Bronk (2011) we dichotomized the parcels based on the median split, as is required when conducting LCA in Mplus (Muthén & Muthén, 1998-2011; Geiser, 2010). The reliabilities of the binary parcels were good (PPM Cronbach's $\alpha = .67$; TPM Cronbach's $\alpha = .78$). We decided to rescale the data to conform to the latest thinking in the field, which has been recently supported by empirical evidence (Finch & Bronk, 2011). However, changes in rescaling the data result in a loss of information, particularly when students have scores in the middle range of the scale. This by-product of the procedure is not as problematic on a 4-point Likert scales as it would be, for example, on a 7-point Likert scale. As abovementioned, the 4-point Likert scale is already based on a bimodal structure. In this instance, however, it was determined that because the bimodal data matched the dichotomous distribution of expected responses based on preliminary research, the creation of categories was acceptable.

The CLCA was run (using Mplus version 6.11; Muthén & Muthén, 1998-2011) with the 6 parcels identifying groups of individuals as a function of scholastic motivation. In the present study, 500 random sets of starting values for the initial stage and 50 final stage optimizations were used to determine the class structures. We used an iterative process starting with a two-class solution and increasing the number of classes incrementally. Additional classes were added until a good fit was achieved. Statistical criteria were used to determine the optimal number of classes. The statistical criteria used to guide this process were the lowest Akaike Information Criteria (AIC) (Akaike, 1973) and the lowest Bayesian Information Criteria (BIC) (Schwarz, 1978), as well as the lowest sample-size adjusted Bayesian Information Criteria (adj. BIC). These criteria values can be used to compare one

model fit with that of others. Furthermore, both the Lo-Mendell-Rubin Adjusted Test (LMR) (Lo, Mendell, & Rubin, 2001) and Bootstrap Likelihood Ratio Test (BLRT) (McLachlan & Peel, 2000) were conducted to demonstrate statistical significance ($p < .05$). The LMR and BLRT are implemented in Mplus (Muthén & Muthén, 1998-2011) and comparing 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 showed to be a consistent and robust indicator for the existence of additional latent classes (Nuylund, Asparouhov, & Muthén, 2007).

3.3 Results

Correlations

Bivariate correlations between the two REMO subscales and various independent measures of motivation are reported in Table 1. Scores on the subscales PPM and TPM were significantly associated with several standardized scales of motivation (e.g. learning goals and performance avoidance goals). These findings suggest a strong conceptual overlap between the scales and therefore provide evidence of convergent validity. Notably, there were significant correlations between PPM, TPM and Academic Drive (AD) ($r = 0.29$; $r = 0.34$) and Learning Goals (LG) ($r = 0.27$; $r = 0.35$). In addition, both Striving for Academic Success (SAS) and Avoidance of Academic Failure (AAF) were positively correlated with PPM ($r = 0.27$; $r = 0.19$) and TPM ($r = 0.32$; $r = 0.15$), as both scales refer to a social feedback from peers or teachers. This means that the more students are motivated by peers and/or teachers (PPM; TPM), the more they tend to link their striving for academic success (SAS) and their avoidance of academic failure (AAF) to others.

Table 1

Means, standard deviations, and intercorrelations between two REMO subscales and independent measures of motivation and academic achievement.

Measure	2	3	4	5	6	M	SD
1. PPM	.41**	.29**	.27**	.27**	.19**	2.55	.51
2. TPM	–	.34**	.35**	.32**	.15**	3.08	.50
3. AD		–	.45**	.59**	.13**	3.13	.71
4. LG			–	.54**	.045	2.96	.51
5. SAS				–	-.38**	2.68	.52
6. AAF					–	2.31	.52

Note. All measures are standardized. PPM = Peers as Positive Motivator; TPM = Teacher as Positive Motivator; AD = Achivement Drive; LG = Learning Goals; SAS = Striving for Academic Success; AAF = Avoidance of Academic Failure; *$p < .05$, ** $p < .001$.

Confirmatory Latent Class Analysis (CLCA)

Table 2 shows the model fit results for CLCA with 2 to 5 classes. Judging from the AIC, BIC and adjusted BIC (lowest value), the 4-class solution (model 3) represents the best fit to our data. Furthermore, the LMR and BLRT tests indicate that model 1 is superior to a solution with only one latent class, model 2 is superior to model 1 and model 3 is superior to model 2. Importantly, model 4 is not superior to model 3 (see Tab. 2).

Table 2

Model fit results

	Statistical Criteria				
	AIC	BIC	Adj. BIC	LMR p value	BLRT p value
1. Model: 2 classes	8097.331	8162.228	8120.938	<.0001	<.0001
2. Model: 3 classes	7854.492	7954.334	7890.809	<.0001	<.0001
3. Model: 4 classes	**7747.641**	**7882.427**	**7796.669**	<.0001	<.0001
4. Model: 5 classes	7748.311	7918.042	7810.051	0.0714	0.2040

Note. AIC = Akaike Information Criteria, BIC = Bayesian Information Criteria, adj. BIC = sample-size adjusted Bayesian Information Criteria (n* = (n + 2) / 24), LMR = Lo–Mendell–Rubin Adjusted Test; BLRT = bootstrap likelihood ratio test (for BLRT an approximated p-value is given);

Therefore, the results of the LMR and BLRT were in agreement with the AIC, BIC, and adjusted BIC. Despite the demonstrated limitations of the chi-square test of model fit in LCA with large sample size (McCutcheon, 2002), the test was not significant in our 4-class solution, providing further support for the model fit. Table 3 shows average estimated probabilities of being in a latent class given membership in one latent class as compared to the other three.

Table 3

Average Latent Class Probabilities

	Classes			
	1	2	3	4
1	0.906	0.017	0.074	0.003
2	0.099	0.814	0.030	0.057
3	0.068	0.008	0.841	0.082
4	0.001	0.027	0.137	0.835

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

The mean assignment probabilities for all participants attached to the same class (diagonal) can be interpreted as reliability measures for the class assignment. It can be seen that these probabilities are above .81 for the four classes, which indicate high classification probabilities for the estimated model. Model 3 estimated for the sample is shown in Figure 1.

Based on the deterministic restrictions (see Fig. 1), the CLCA confirmed the four hypothesized self-perceived motivation types (MT) (see Fig. 2): (1) teacher-dependent MT, (2) peer-dependent MT, (3) teacher- and peer-dependent MT and (4) teacher-and-peeer-independent MT. Membership for this 4-class solution was as follows: 9.5% teacher-dependent MT (50 girls, 57 boys), 36.5% peer-dependent MT, (233 girls, 161 boys), 27.8% teacher- and peer-dependent MT and (166 girls, 126 boys), and 26.3% teacher-and-peeer-independent MT (138 girls, 157 boys).

3.4 Discussion

Based on individual variability in students' perceptions of the importance of social relationships for their motivation, and considering results of preliminary studies, four

different motivation types (MT) were expected: (1) teacher-dependent MT, (2) peer-dependent MT, (3) teacher- and peer-dependent MT, (4) teacher- and peer-independent MT. Using Confirmatory Latent Class Analysis the hypothesized 4-class typology was confirmed. The teacher-dependent MT is focused mainly on teachers, especially characteristics such as sympathy, as well as awareness of students' abilities and interest in the subject. The teacher-dependent MT is motivated independent of relationships with peers, whereas the peer-dependent MT is motivated independent of relationships with teachers. The motivation of the peer-dependent MT is connected to peer learning behavior, e.g. classmates learning behavior influences the student's motivation to learn. The motivation of the teacher- and peer-dependent MT is related to both teachers and peers. For this mixed-type, social relationships are an important source of motivation. In contrast, the motivation of the teacher- and peer-independent MT does not show a dependence on social relationships, i.e. the teacher's teaching style and engagement as well as the peer learning behavior and school engagement, their awareness of student's progress and abilities are not essential to scholastic motivation for students of this motivation type.

The class of peer-dependent MT is the largest, which underscores the increasingly important role of peers during adolescence in many aspects of development, including motivation (Cook, Deng, & Morgano, 2007; Fend, 1998; Brown, 1990; Brown & Theobald, 1999; Savin-Williams & Berndt, 1990). Nevertheless, we see that teachers continue to be an important source of motivation for many students evidenced by the finding that almost 40% of the sample (teacher-dependent MT and teacher- and peer-dependent MT) perceive teachers as such. The teacher-dependent MT class is considerably smaller than the other three, indicating that for most students, the teacher is not perceived to be the sole source of motivation. However, for some students this is the case and this might be explained by

intrapersonal processes such authority-orientation or interpersonal processes such as difficulties with peer relationships. It can be assumed that the motivation of the teacher- and peer-dependent MT is more closely tied to environmental factors in general, and social relationships in particular, suggesting that for these students, motivation would vary as a function of their social climate. As such, these students would benefit from stable social relationships with both peers and teachers. In contrast, the teacher- and peer-independent MT does not perceive scholastic social relationships to be important for motivation. Students of this type might not fit best into the traditional educational system, which is based on learning in classroom settings and strong teacher involvement. These students might tend towards a more autonomous learning environment with fewer instructions from teachers and less peer contact. Perhaps individual factors, such as self-efficacy, self-determination, and personality are more essential for their motivation. In addition, contextual factors such as family, media and friendships might be considered as a source of motivation.

With regard to individual and developmental differences, the establishment of learning typologies might help to foster and support each student individually within the school system. The typology underscores differences in the bidirectional interactions between students and their environment (Wigfield & Eccles, 2001). Considering these differences, teacher training and education curricula should include an understanding of students' individual motivation styles in order to better support students and accommodate their individual learning and motivation preferences. This typology should be used as a gateway to understanding the differences in scholastic motivation, i.e. students act and react in their own specific way and at their own specific pace. In general, schools expect students to learn and behave in uniform ways and students who do not fit this pattern are often viewed as maladjusted instead of, as our research has shown, having different motivational needs.

It is important to note at this point that the types should not be understood or used as fixed labels, as this inhibits our ability to see a unique individual's whole dynamic potential. The typology indicates that individuals tend to be socially motivated in specific ways. Teachers, educators, parents and students themselves can use this information to improve children's learning by understanding and building on their individual motivation type.

Strengths, Limitations and Future Research

The present study has important theoretical, methodological, and statistical strengths. Firstly, the roles of both peers and teachers as motivators were considered, whereas most studies focus on the influence of either peers or teachers (Wentzel, Donlan, & Morrison, 2012). Secondly, theoretical approaches from motivation research, as well as literature from educational and school psychology, were considered in the development of the REMO scales in order to effectively measure the association between social relationships and motivation. Thirdly, with regard to differences in motivation patterns, the typology enhances our understanding of diversity in motivation instead of relying and focusing on generalities. Fourthly, the latent class model fit was a clear statistical strength of the study. Finally, the sample includes a large number of students and schools, which provides support for the generalizability of the typology. The most noteworthy strength of the current study is its exploratory nature guided by an attempt to establish a new approach in motivation research, one that focuses on differences in motivational types.

Methodological limitations merit consideration when interpreting the current findings. Firstly, the study is limited in its sole reliance on self-report measures, although we were specifically interested in students' perception of social relationships and motivation, we understand that findings from multiple raters using multiple methods are more reliable and generalizable. Secondly, the data are cross-sectional, which limits assertions about the

stability/flexibility of the typology over time. For this reason, the current findings cannot be generalized to a broader population.

The present results lead naturally to several research questions concerning differences between the motivation types. For example, if scholastic environmental factors such as social relationships are not important for the independent MT, what are their sources of motivation? Are individual factors, such as personality or self-efficacy, and contextual factors, such as family, media and friendship more important for the teacher- and peer-independent MT, or do these students perhaps differ in their motivational typology (e.g. extrinsic/intrinsic) from the other motivational types (Deci & Ryan, 1985). And finally, are there other motivation types or subtypes of the identified types that have not been considered? In other words, is further differentiation of the model needed? These questions and others are currently being addressed within the framework of our overall method triangulative research design (e.g., quantitative, qualitative, experimental). In conclusion, the current study approaches motivation in a way that can help teachers to clarify and operationalize the concept so that they can foster the motivation of all their students. This will hopefully lead to effective and efficient interventions that are sensitive to the individual needs of students.

3.5 References

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CHAPTER 4

STUDY III:

Does Self-Determination Predict the School Engagement of Four Different Motivation Types in Adolescence?

Abstract

In order to enhance our understanding of interindividual differences in scholastic motivation, the present study examined if self-determination predicts the school engagement of four different socio-motivation types (MT): (1) peer-dependent MT, (2) teacher-dependent MT, (3) peer-and-teacher-dependent MT, (4) peer-and-teacher-independent MT. The participants were a large sample large (N = 1088) of adolescent students from Brandenburg, Germany. By using structural equation modeling (SEM) the four types were first compared on latent variables (perceived self-determination, school engagement) and then a latent multigroup SEM was conducted to test if self-determination (competence, relatedness, autonomy) would predict emotional and behavioral school engagement separately by MT. The findings underscore the relevance of the typology as well as important interindividual differences in the association between students' psychological needs (competence, relatedness, autonomy) and their school engagement.

Keywords: scholastic motivation, social relationships, self-determination, school engagement, multigroup structural equation modeling

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Does Self-Determination Predict the School Engagement of Four Different Motivation Types in Adolescence?

4.1 The Interplay of Self-Determination and School Engagement

Research has shown that for most students both the teacher-student relationship and the student-student relationship have a profound impact on scholastic motivation (Harter, 1996; Wentzel, 2009a, 2009b; Wentzel, Battle, Russell, & Looney, 2010), academic achievement (Flanagan, Erath, & Bierman, 2008; Raufelder & Mohr, 2011; Wentzel, 1998) as well as personal development (Birch & Ladd, 1996; Erikson, 1959; Harter, 1996). For others, however, changes in self and environment, such as shifting peer relationships or the quality of the teacher-student relationship, are not necessarily associated with detrimental outcomes in the abovementioned areas (Wigfield & Eccles, 2001). In line with this phenomenon, research suggests that some students' scholastic motivation is constant across years of schooling (Deci & Ryan, 2000), independent of changes in themselves or in the social environment. Though important, this past research is unable to shed light on why motivation patterns might differ across individual adolescents.

One construct that is inherently linked to motivation is school engagement, in that engagement can arise out of motivation (Reeve, 2012). The distinction between the two constructs is that motivation is relatively more private and subjectively experienced, whereas engagement can be understood as the more publically observed behavior (Reeve, 2012). In general, school engagement is associated with higher motivation (Jimerson, Campos, & Greif, 2003), school performance (Fall & Roberts, 2012; Manlove, 1998), functions as a protective factor against school drop-out (Fall & Roberts, 2012; Fredricks, Blumenfeld, & Paris, 2004) and predicts high academic achievement across demographics (e.g., gender, race, ethnicity,

socioeconomic status) (Finn & Rock, 1997; Wehlage et al., 1989). In the present study, a two-component model of the multi-dimensional concept of school engagement was used, which included a *behavioral* (e.g., positive conduct, effort, participation) and an *emotional* (e.g., interest, identification, belonging, positive attitude about learning) component (Finn, 1989; Marks, 2000; Newmann, Wehlage, & Lamborn, 1992; Willms, 2003). Whereas behavioral school engagement refers to involvement in school activities and participation in the classroom, emotional school engagement describes the student's feelings towards teachers, classmates, and the institution (Fredricks, Blumfeld, & Paris, 2004).

One theory that represents a broad framework for the study not only of motivation but also of engagement is Self-Determination Theory (SDT) (Deci & Ryan, 1985; Ryan, 2009; Reeve, 2012), as it is a macro theory of human motivation and personality development, delineating peoples' inherent growth tendencies and their innate psychological needs (Deci & Ryan, 2000). In addition, SDT provides a meta-theory for framing motivational studies within interindividual differences. Although motivation arises from many different sources (e.g., needs, cognitions, emotions, environmental events) (Reeve, 2012), the present study follows a needs-based perspective as conditions supporting an individual's basic psychological needs are argued to foster the most volitional and high quality forms of motivation and engagement for activities, such as school engagement – including enhanced performance, persistence, and creativity (Deci & Ryan, 1985, 2000a, 2000b).

It has been several decades since motivation researchers first suggested that *needs* are the fundamental drivers of human behavior (Latham & Pinder, 2005). Maslow's famous "pyramid of needs" (1943), for instance, suggested five hierarchically ordered needs ranging from physiological sustainability to self-actualisation. McClelland (1965) proposed that individuals differ in the extent to which they develop needs, for instance, the need for

achievement, affiliation and power (van den Broeck, Vansteenkiste, de Witte, Soenens, & Lens, 2010). The three innate psychological needs identified in SDT as crucial for an individual's optimal functioning (Deci & Ryan, 2000; Vansteenkiste, Ryan, & Deci, 2008) are: (1) autonomy (i.e., to feel self-determining in one's actions rather than feeling controlled or obliged to act), (2) relatedness (i.e., to feel that one has satisfying and supportive social relationships) and (3) competence (i.e., to feel competent in dealing with ones' environment). Satisfying these basic psychological needs is vital for one's enjoyment, personal growth, effective functioning and psychological well-being, motivation and high-quality engagement (Reeve, 2012; Deci & Ryan, 2000; Jang, Reeve, Ryan, & Kim, 2009; Pfaeffli & Gibbons, 2010). According to Deci and Ryan high self-determination supports need satisfaction, which in turn increases motivation and school engagement (Reeve & Tseng, 2011; Reeve, 2012). In general, SDT identifies vitalizing students' inner motivational resources as a key step in facilitating high-quality engagement (Reeve & Halusic, 2009; Reeve, 2012).

SDT asserts that needs are innate and are affected by social contexts (Deci & Ryan, 2000), meaning that some people develop stronger needs than others, which leads to interindividual differences. For some adolescent students school is a need-supportive environment, such that autonomy, competence, and relatedness are principle features of daily school life (Mouratidis, Vansteenkiste, Sideris, & Lens, 2011). In particular, peers and teachers are essential in supporting the satisfaction of needs in the school context as they can develop and foster a student's feelings of relatedness, autonomy and competence (Niemiec & Ryan, 2009). It is our contention, however, that for other students, the school context may not be optimal for the satisfaction of their basic needs. This assumption is mainly based on our preliminary research.

Preliminary Research – 4 different motivation types

The different role peers and teachers play in adolescents' scholastic motivation was first examined in a six-month pilot ethnographic field study conducted in a secondary school with a group of German adolescents and teachers (Raufelder, 2007). By using participant observation, ethnographic field notes and qualitative interviews, differences in students' expectations about teachers and peers as motivators were identified. Results indicated support for interindividual differences, such that for some students positive feelings towards a teacher were essential to their motivation, however for others motivation was not contingent on positive feelings towards their teachers, they rather appreciated the professional abilities of a teacher, including a clear teaching style or a logical way of explaining subject matter. In addition, some students highlighted the role of their peers as a source of motivation suggesting that the peer group might set norms for learning behavior and attitudes towards school. Finally, there were students that described neither teachers nor peers as sources of motivation.

In an effort to understand the diverse findings of the ethnographic field study, the REMO (Relationships & Motivation) measurement was developed to assess students' perceptions of peers and teachers as motivators (Raufelder, Drury, Jagenow, Hoferichter, & Bukowski, 2013). Using the two REMO-scales "Peers as Positive Motivators" (PPM) and "Teachers as Positive Motivators" (TPM) a confirmatory latent class analysis (CLCA) was conducted in order to enhance our understanding of interindividual differences in scholastic motivation. Person-oriented methods, such as latent class analysis (LCA), enable the researcher to identify important intraindividual and interindividual differences and thus model distinct configurations of heterogeneity within a given sample (Rosato & Baer, 2012; Raufelder, Jagenow, Hoferichter, & Drury, 2013).

By using CLCA and as such incorporating heterogeneity into the analyses, four different motivation types were identified: (1) teacher-dependent MT, (2) peer-dependent MT, (3) peer-and-teacher-dependent MT and (4) peer-and-teacher-independent MT. Membership for the 4-class solution was as follows: 9.5% teacher-dependent MT (50 girls, 57 boys), 36.5% peer-dependent MT, (233 girls, 161 boys), 27.8% peer-and-teacher-dependent MT (166 girls, 126 boys), and 26.3% peer-and-teacher-independent MT (138 girls, 157 boys) (Raufelder, Jagenow, Drury, & Hoferichter, 2013). Students of the teacher-dependent MT can be described as focused mainly on teachers, their characteristics such as sympathy, as well as their awareness of students' abilities and interest in the subject. In contrast, students of the peer-dependent MT do not rely on their relationships with teachers as a source of motivation. Their scholastic motivation is instead connected to peer learning behavior, e.g. classmates learning behavior influences the student's motivation to learn. Students, who have been identified as peer-and-teacher-dependent MT, need both peers and teachers as sources of motivation. In contrast, social relationships are not essential to scholastic motivation for students of the teacher-and-peer-independent MT. They show no dependence on peers or teachers as sources of motivation.

This typology underlines the differences in adolescents' scholastic motivation and confirms our belief that students rely differently on teachers and peers as sources of motivation. The main goal of the current study is to deepen our understanding of these differences by investigating group mean differences in self-determination, school engagement and different forms of motivation. In addition, we wish to understand the connection between self-determination and motivation for each motivation type. By using multigroup SEM we test if the three basic needs (relatedness, competence and autonomy) of self-determination

function as predictors of school engagement and the quality of motivation for each motivation type separately.

Current Study

Based on SDT and the empirical background outlined above, the current study examined if self-determination predicts school engagement in four different motivation types (MT) of adolescent students. We examined the following two hypotheses:

Hypothesis 1: Group differences in self-determination and school engagement. We hypothesized that the four identified motivation types would differ in their perceived self-determination and school engagement. We assumed that the peer-and-teacher-dependent MT might have the highest mean values on competence and relatedness, because these needs are well satisfied: competence through teacher-dependency and relatedness through peer-dependency. In contrast, we expected that the peer-and-teacher-independent MT might have the highest value on autonomy in comparison to the other three MTs, as students of this MT are free of any dependency and therefore free of any expectations from peers or teachers. In addition, we assumed that the peer-and-teacher-dependent MT would show more school engagement, as two of his/her basic needs would be well satisfied. Furthermore, daily school life is dominated by social interactions with peers and therefore this MT's school engagement might benefit from their socio-motivational style. For exactly the same reason, we assumed that the peer-and-teacher-independent MT and the teacher-dependent MT would report lower values of school engagement.

Hypothesis 2: Self-determination as predictor of school engagement. Based on SDT and in light of the positive associations between perceived self-determination (competence, relatedness, autonomy), motivation and school engagement, we hypothesized that perceived self-determination would predict school engagement for each motivation type (MT). We

assumed that perceived relatedness would be a stronger predictor for the peer-and-teacher-dependent MT, as well as for the peer-dependent MT. In addition, we expected that autonomy would function as a predictor for the peer-and-teacher-independent MT. Due to the fact that the teacher-dependent MT is solely focused on the teacher in its professional role, we assumed that competence might function as a predictor for this motivation type.

4.2 Method

Participants

Seventh- and eighth-grade students (N = 1088) aged 12–15 years (M_{age} = 13.70; SD = 0.53) from secondary schools in the state of Brandenburg (Germany) were asked to complete questionnaires assessing perceived peer motivation, teacher motivation, self-determination, school engagement and different forms of motivation. We chose to study this age group because it is precisely during this period that students' motivation declines rapidly, starting after the transition to secondary school and continuing throughout the first three years of high school (Harter, 1996), reaching its nadir in grade nine (Eccles, Wigfield, & Schiefele, 1998; Watt, 2004; Zusho & Pintrich, 2001). Approximately 53.9% of the students were girls (n = 587) and 46.1% were boys (n = 502). By using confirmatory latent class analysis 9.5% of the students were identified as teacher-dependent MT (50 girls, 57 boys), 36.5% as peer-dependent MT, (233 girls, 161 boys), 27.8% as peer-and-teacher-dependent MT (166 girls, 126 boys), and 26.3% as peer-and-teacher-independent MT (138 girls, 157 boys) (Raufelder, Jagenow, Drury, & Hoferichter, 2013). Ethnicity data was not collected, due to the very low percentage of ethnic minorities in Brandenburg (2.6%). German law prohibits asking a first party for information about a second party (e.g., asking students about the income of their

parents), which made it impossible to gather data on socio-economic status. Out of a pool of 124 secondary schools in Brandenburg, the 23 participating schools were selected randomly.

Procedure

Permission to conduct the study was granted by the governmental Department of Education, Youth and Sport of Brandenburg. Subsequently, parental permission for student participation was obtained. Data were collected during class time on two consecutive days in the fall of 2011. The students were thoroughly introduced to the questionnaires and given instructions on how to complete the measures, in particular, how to use the 4-point to 6-point Likert scales. In addition, the researchers informed the students that participation in the study was voluntary, that all of their answers would be confidential and that they were not obliged to answer any questions. Because we were especially interested in students' perceptions of their social relationships, personalities, self-determination and school engagement, the study focuses on self-report. Furthermore, we have thoroughly considered both the advantages and disadvantages of self-report data and have thus interpreted our findings accordingly (Chan, 2009).

Measures

School Engagement. Based on the work of Skinner et al. (2008), a distinction was made between *emotional* and *behavioral school engagement*. Both variables contained a 6-item scale ($\alpha = .71$ and $\alpha = .75$ respectively). Items were presented as statements and participants answered how well each statement described their feelings or behavior. Emotional (e.g., "Class is fun") as well as behavioral school engagement (e.g., "In class I work as hard as I can") was measured using a 5-point Likert scale containing a range from 1 = strongly disagree to 5 = strongly agree.

Perceived Self-Determination. Based on SDT (Deci & Ryan, 1985) self-determination was measured with three German subscales developed by Prenzel, Kristen, Dengler, Ettle and Beer (1996): *competence* (e.g., "During class, the teacher tells me what I can improve" (α = .79), *autonomy support* (e.g., "During class, I can work independently on tasks" (α = .72), and *relatedness* (e.g., "During class, the atmosphere is friendly and relaxed" (α = .87). Items were rated on a 6-point Likert scale (1= "never" to 6 = "very often").

Statistical Analyses

Comparing Groups on Latent Variables. Testing for group mean differences on a set of observed variables typically requires the use of multivariate analysis of variance (MANOVA) (Dimitrov, 2006). While MANOVA is more appropriate when groups are compared on a construct which "emerges" as a linear composite of the observed variables, structural equation modeling (SEM) is more appropriate with a latent variable system in which the construct (latent variable) has a causal influence on the observed variables (Bollen, 1989). In addition, unlike MANOVA, SEM methods provide error-free measures of the latent variables (constructs, factors, subscales) by eliminating the random error of measurement for the observed variables (e.g., questionnaire items) associated with the latent variable(s) (Aiken, Stein, & Bentler, 1994; Dimitrov, 2006). In order to examine the equivalence of all measurement and structural parameters of the factors across all the four motivation types a five-step process was followed: (1) Test the CFA model separately in each group, (2) test for equal form (identical factor structure – all parameters free), (3) test the equality of factor loadings, (4) test the equality of indicator intercepts and (5) test the equality of factor covariances (Brown, 2006; Christ & Schlüter, 2012).

Multigroup Structural Equation Modeling. Structural Equation Models (SEM) with Mplus version 7.0 (Mplus 7.0; Muthén & Muthén 1998–2012) and robust maximum likelihood estimation (MLR) were used to assess the hypothesized relationships between the variables of interest. In these models, latent variables were used to test the predicting role of self-determination on school engagement and different types of motivation (Hypothesis II). We conducted SEMs accounting for nesting in school classes using the approach proposed by Asparouhov (2005) for complex survey data (type is complex). This multilevel approach corrected standard error biases created by the nested nature (students/class) of our data (MacKinnon 2008). The 'type is complex' code specified that the sampling is complex, meaning that the data were clustered in groups (school classes), here clustering occurred in 71 school classes.

Model fit was estimated in Mplus using 5 primary fit indices for the model fit as recommended by Hu and Bentler (1999): Chi-Square Test of Model Fit (χ^2), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI) and Standardized Root Mean Square Residuals (SRMR). To account for missing data models were estimated with Mplus full information maximum likelihood (FIML) using version 7.0. (Mplus 7.0; Muthén & Muthén 1998–2012).

In order to test for potential differences among the four MTs in the SEM, a stepwise multigroup analysis was conducted by applying (1) an unrestricted model, a (2) semi-restricted model and a (3) fully-restricted model, which subsequently were compared by using the χ^2-difference test (Geiser, 2010; Yuan & Bentler, 2004). In the first step, the unrestricted model was tested in which all parameters are set free across the different groups. This implies that the factor loadings, residual variances and regression coefficients may differ between the four different MTs, placing no restriction on the parameters whatsoever. In a second step, the

semi-restricted model was applied, assuming equal factor loadings, free residual variances and free regression coefficients among the four different MTs. In a third step, the fully-restricted model was applied, assuming equal factor loadings, equal residual variances and equal regression coefficients across all four MTs.

4.3 Results

Correlations

Bivariate correlations between the three perceived self-determination subscales and both subscales of school engagement were conducted for each motivation type separately (see Table 1). In general, each aspect of perceived self-determination was significantly associated with both aspects of school engagement. The exception was that there was no positive correlation between autonomy and emotional school engagement for the teacher-dependent MT. In addition, the correlation between autonomy and behavioral school engagement for the teacher-dependent and independent MT, as well as the correlation between competence and behavioral school engagement for the teacher-dependent MT and the correlation between relatedness and emotional school engagement <.05 were significant. Taken together, scores on the subscales underline the interindividual differences between the four MTs.

Table 1

Means, Standard Deviations and Intercorrelations between Self-Determination and School Engagement for the four Identified Motivation Types (MT)

Peer & Teacher MT							
Measure	2	3	4	5	Means	SD	Range
1. SDC	.41**	.53**	.28**	.34**	4.20	.97	1-6
2. SDR	—	.43**	.13*	.26**	4.60	1.15	1-6
3. SDA		—	.30**	.22**	4.23	1.01	1-6
4. ESE			—	.45**	2.89	.49	1-4
5. BSE				—	2.80	.52	1-4
Teacher MT							
Measure	2	3	4	5	Means	SD	Range
1. SDC	.49**	.33**	.26**	.20*	3.95	1.02	1-6
2. SDR	—	.37**	.29**	.28**	4.13	1.17	1-6
3. SDA		—	.18	.20*	4.03	.89	1-6
4. ESE			—	.61**	2.86	.63	1-4
5. BSE				—	2.61	.60	1-4
Peer MT							
Measure	2	3	4	5	Means	SD	Range
1. SDC	.35**	.45**	.36**	.33**	3.99	.86	1-6
2. SDR	—	.42**	.19**	.28**	4.44	.93	1-6
3. SDA		—	.31**	.24**	4.07	.85	1-6
4. ESE			—	.55**	2.75	.48	1-4

5. BSE				—	2.60	.51	1-4

Independent MT							
Measure	2	3	4	5	Means	SD	Range
1. SDC	.47**	.44**	.37**	.33**	3.81	.99	1-6
2. SDR	—	.48**	.26**	.20**	4.19	1.12	1-6
3. SDA		—	.24**	.15*	3.90	.97	1-6
4. BSE			—	.56**	2.42	.55	1-4
5. ESE				—	2.56	.56	1-4

Note. All measures are standardized. SDC = Self-Determination Competence; SDR = Self-Determination Relatedness; SDA = Self-Determination Autonomy; BSE = Behavioral School Engagement; ESE = Emotional School Engagement, *$p < .05$, ** $p < .001$.

Comparing groups on latent variables: Multigroup CFA

Group mean comparisons were conducted on the following latent variables: self-determination (competence, autonomy, relatedness) and school engagement (behavioral and emotional). In order to examine the equivalence of all measurement and structural parameters of the factors across all the four motivation types a five-step process was followed (Brown, 2006; Christ & Schlüter, 2012). According to Brown (2006) a key advantage of multi-groups CFA is the examination of all aspects of measurement invariance and population heterogeneity across groups (i.e., factor loadings, intercepts, residual variances, factor variances, factor covariances, latent means). In stepwise fashion we tested for equal factor structures (form invariance = unrestricted model 0), equal factor loadings (full metric invariance = model 1; partial metric invariance = model 1b), equal intercepts (full scalar

invariance = model 2) and equal covariances (model 3). The analysis started off with the least restricted solution (equal form) and subsequent models were evaluated (using nested χ^2 methods) that included increasingly restrictive constraints. As such, the variability of the fully constrained model rests on the results of the less restrictive models. This method also allows for the testing of partial invariance, which entails comparing group means when some but not all of the factor loadings and intercepts are invariant. Our sequence of multiple group invariance evaluation was as follows: (1) Test the CFA model separately in each group (see Table 2); (2) test for equal form (identical factor structure – all parameters free); (3) test the equality of factor loadings; (4) test the equality of indicator intercepts; (5) test the equality of factor covariances. For steps 2–5 see Table 3. Based on the results of these analyses we subsequently tested for group mean differences.

Table 2

Model Fit Indices for Self-Determination and School Engagement

Construct	Model	*df*	x^2	*p*	CFI	RMSEA	90% CI (RMSEA)	SRMR
				Single-group analysis				
Self-determination	Peer&Teacher MT	6	5.41	.50	1.00	.00	(.00-.07)	.01
	Teacher MT	6	3.57	.73	1.00	.00	(.00-.09)	.02
	Peer MT	6	11.51	.07	.99	.05	(.00-.09)	.02
	Independent MT	6	3.7	.72	1.00	.00	(.00-.06)	.01
				Multigroup analysis				
	Model 0	24	24.21	.45	1.00	.01	(.00-.05)	.02
	Model 1	42	57.30	.06	.99	.04	(.00-.06)	.12

	Model 1b	36	41.89	.23	1.00	.03	(.00-.05)	.07
	Model 2	45	46.61	.41	1.00	.01	(.00-.04)	.07
	Model 3	54	55.07	.43	1.00	.01	(.00-.04)	.07
				Single-group Analysis				
School	Peer&Teacher MT	8	17.85	.02	.96	.07	(.02-.11)	.02
Engagement	Teacher MT	8	14.82	.10	.97	.08	(.00-.16)	.04
	Peer MT	8	20.18	.01	.98	.06	(.03-.10)	.03
	Independent MT	8	11.87	.16	.99	.04	(.00-.09)	.03
				Multigroup Analysis				
	Model 0	32	64.73	.00	.98	.06	(.04-.08)	.04
	Model 1	50	94.02	.00	.97	.06	(.04-.08)	.10
	Model 1b	46	77.60	.00	.98	.05	(.03-.07)	.07
	Model 2	58	89.02	.01	.98	.05	(.03-.06)	.07
	Model 3	61	91.06	.01	.98	.04	(.02-.06)	.07

Note. Model 0 = unrestricted baseline model (all parameters free); Model 1 = equality of factor loadings (full metric invariance); Model 1b = one factor loading in two groups and two factor loadings in one group was set free for school engagement (partial metric invariance) and two factor loadings in three groups were set free for self-determination (partial metric invariance); Model 2 = equality of intercepts (scalar invariance); Model 3 = Model 2 with covariance constraints;

Table 3

Testing for Equality of Form, Factor Loadings and Intercepts: χ^2–Difference Tests

Construct	Step	Model	$\Delta \chi^2$	*p*	Δ *df*
Self Determination	3	Model 1 compared to Model 0	33.09	.02*	18
	3	Model 1b compared to Model 0	17.68	.13	12
	4	Model 2 compared to Model 1b	4.72	.86	9
	5	Model 3 compared to Model 2	8.46	.49	9
School Engagement	3	Model 1 compared to Model 0	29.29	.04*	18
	3	Model 1b compared to Model 0	12.87	.54	14
	4	Model 2 compared to Model 1b	11.42	.50	12
	5	Model 3 compared to Model 2	2.04	.56	3

Note. Model 0 = Baseline all groups - equal form (form invariance); Model 1 = equality of factor loadings (metric invariance); Model 1b = one factor loading in two groups and two factor loadings in one group was set free for school engagement (partial metric invariance) and two factor loadings in three groups were set free for self-determination (partial metric invariance); Model 2 = equality of intercepts (scalar invariance); Model 3 = Model 2 with covariance constraints; *$p < .05$, ** $p < .001$;

Self-determination. Multiple group invariance evaluation for self-determination revealed equality of factor structure, partial equality of factor loadings, equality of intercepts and equality of covariances across the four groups, allowing for group mean comparisons on self-determination (Brown, 2006). Mean comparisons showed that compared to the peer-and-teacher-dependent MT, the teacher-dependent MT ($\beta = -.44$, $p = .001$), the peer-dependent MT ($\beta = -.24$, $p = .006$) and the peer-and-teacher-independent MT ($\beta = -.40$, $p < .001$) showed significantly less competence as well as autonomy (teacher MT: $\beta = -.30$, $p = .039$;

peer MT: β = –.19, p = .047; independent MT: β = –.51, p < .001). In addition, the teacher-dependent MT (β = –.39, p = .004) and the peer-and-teacher-independent MT (β = –.35, p < .001) reported significantly less relatedness than the peer-and-teacher-dependent MT.

School Engagement. Multiple group invariance evaluation for school engagement revealed equality of factor structure, partial equality of factor loadings, equality of intercepts and equality of covariances across the four groups, allowing for group mean comparisons on school engagement (Brown, 2006). The χ^2-difference test between Model 0 and Model 1 showed that the p-value is close to .05, which indicates a good approximative invariance, particularly considering the huge sample size.

Mean comparisons revealed that compared to the peer-and-teacher-dependent MT, the teacher-dependent MT (β = –.49, p = .001), the peer-dependent MT (β = –.47, p < .001) and the peer-and-teacher-independent MT (β = –.89, p < .001) showed significantly less emotional school engagement. In addition, the peer-dependent MT (β = –.41, p < .001) and the peer-and-teacher-independent MT (β = –.75, p < .001) reported significantly less behavioral school engagement.

Multigroup Structural Equation Modeling

Three Multigroup Structural Equation Models (SEM) with Mplus version 7 (Muthén & Muthén, 1998–2012) were run to assess if self-determination (competence, relatedness and autonomy) functions as predictor of both behavioral and emotional school engagement: (1) a unrestricted model, (2) a semi-restricted model, and (3) a fully-restricted model. All three models included direct paths from self-determination (competence, relatedness and autonomy) to behavioral and emotional school engagement Covariances were included for the associations between competence and relatedness, competence and autonomy, autonomy and

relatedness. In addition, covariances between emotional and behavioral school engagement were included as well. (see Figure 1 – Figure 4).

To test for measurement invariance an unrestricted model with all parameters free was investigated in a first step. The indices indicated a satisfactory fit for this unrestricted model (χ^2 (488) = 892.45, $p < .001$; CFI = .91, RMSEA = .06; SRMR = .06). In a second step, a semi-restricted model was applied, assuming equal factor loadings and intercepts, free residual variances and free regression coefficients among boys and girls. The semi-restricted model showed a good fit (χ^2 (566) = 951.896, $p < .001$; CFI = .92; RMSEA = .05; SRMR = .07). By way of a chi-square difference test this multigroup model was compared to the unrestricted model (χ^2 (78) = 61.34, $p = .917$) (Satorra & Bentler, 2001). The non significant p value indicates that the semi-restricted model was favored as opposed to the unrestriced model. In other words, this finding confirms full measurement invariance and allows for group comparison. In a third step, a fully-restricted model was applied, assuming equal factor loadings, equal residual variances and equal regression coefficients across all four groups. The indices indicated a satisfactory fit for this fully-restricted model (χ^2 (588) = 986.39, $p <$ .001; CFI = .91, RMSEA = .05; SRMR = .07), though it was worse than for the semi-restricted model (see Table 4). The χ^2-difference test (Christ & Schlüter, 2012; Yuan & Bentler, 2004) was conducted to compare the semi-restricted to the fully-restricted model. The test reached significance (χ^2 (22) = 34.64, $p = .042$) (Satorra & Bentler, 2001), which means that the semi-restricted multigroup model replies the data better than the fully-restricted model. In other words, the interrelations among the study variables exhibited different patterns for the four different MTs (Geiser, 2010; Yuan & Bentler, 2004). In detail, the results of the model for each MT were divergent, and the hypothesis that the latent

regression coefficients were the same within each group was rejected. Therefore, the results will be reported separately for the four groups.

Table 4

Model fit indices for the unrestricted model, the semi-restricted model and the fully-restricted model

Indices	Unrestricted Model	Semi-restricted Model	Fully-restricted Model
χ^2-Test of Model Fit	892.448	951.896	986.387
(df)	488	566	588
p(χ^2)	< .001	< .001	<. 001
CFI	.91	.92	.91
RMSEA (90% CI)	.06 (.05-.06)	.05 (.05-.06)	.05 (.05-.06)
SRMR	.06	.07	.07

Note. df = degrees of freedom, RMSEA = Root Mean Square Error of Approximation, CFI = Comparative Fit Index, SRMR = Standardized Root Mean Square Residuals

Peer-and-Teacher MT. The model included direct paths from self-determination (competence, relatedness and autonomy) to behavioral and emotional school engagement. Covariances were included for the associations between competence and relatedness (r = 0.29, $p < .001$), competence and autonomy ($r = 0.35$, $p < .001$), autonomy and relatedness (r = 0.52, $p < .001$). In addition, covariances between emotional and behavioral school engagement ($r = 0.09$, $p < .001$) were significant as well. Two significant direct effects were (see Figure 2): autonomy support predicts behavioral school engagement ($B = 0.14$, $\beta = 0.36$, $SE = 0.08$, $p = .039$) and competence predicts emotional school engagement ($B = 0.35$, β =

0.41, *SE* = 0.12, *p* = .003). This model explained about 23% of the variance in behavioral school engagement (R^2 = .231) and 24% of emotional school engagement (R^2 = .240).

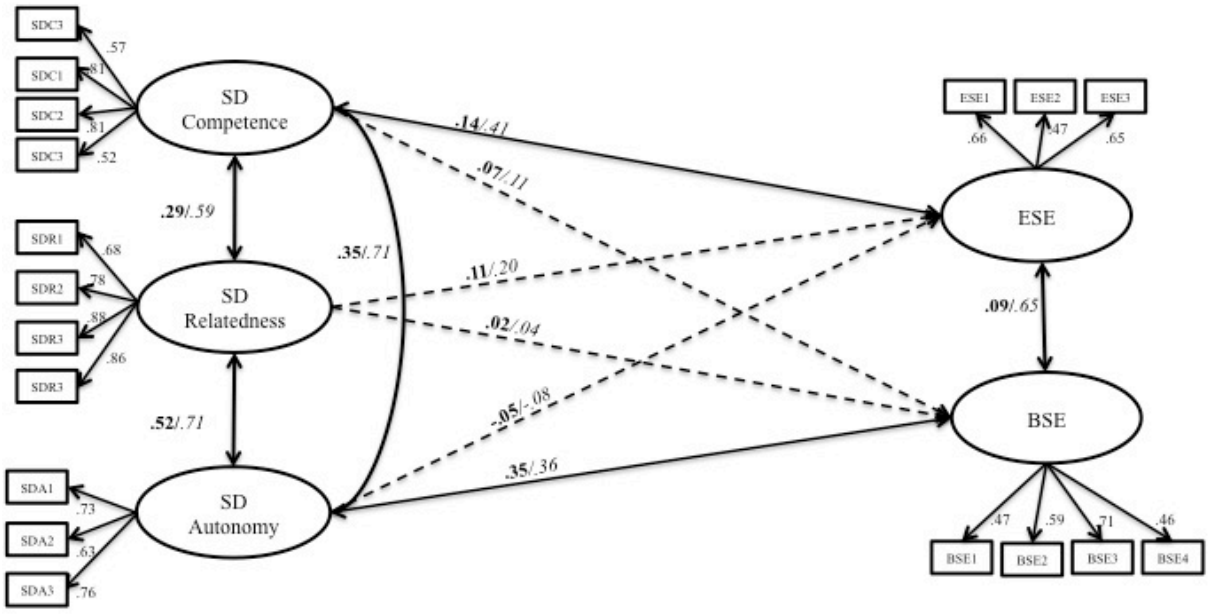

Figure 1. Multigroup Structural Equation Model (Peer&Teacher MT). Significant effects shown as unstandardized coefficients (B) in bold face and standardized coefficients (β) in italics; Factor loadings shown as standardized coefficients. Bold pathways are significant at p < 0.05; dotted pathways are not significant;

Note. SD = Self-Determination; ESE = Emotional School Engagement; BSE = Behavioral School Engagement;

Teacher MT. The results of our analysis for the teacher-dependent MT are shown in Figure 3. The model included direct paths from self-determination (competence, relatedness and autonomy) to behavioral and emotional school engagement. Covariances were included for the associations between competence and relatedness (*r* = 0.29, *p* < .001), competence and autonomy (*r* = 0.22, *p* = .001), autonomy and relatedness (*r* = 0.33, *p* < .001). In addition, the covariance between behavioral and emotional school engagement (*r* = 0.18, *p* = .001) was

found to be significant. In total, two significant direct effects were (see Figure 3): relatedness predicts both emotional (B = 0.38, β = 0.51, SE = 0.14, p = .007) and behavioral school engagement (B = 0.29, β = 0.47, SE = 0.12, p = .014). In contrast, neither competence nor autonomy functioned as a predictor for the teacher-dependent MT. This model explained about 26% of the variance in behavioral school engagement (R^2 = .264) and 23% of emotional school engagement (R^2 = .230).

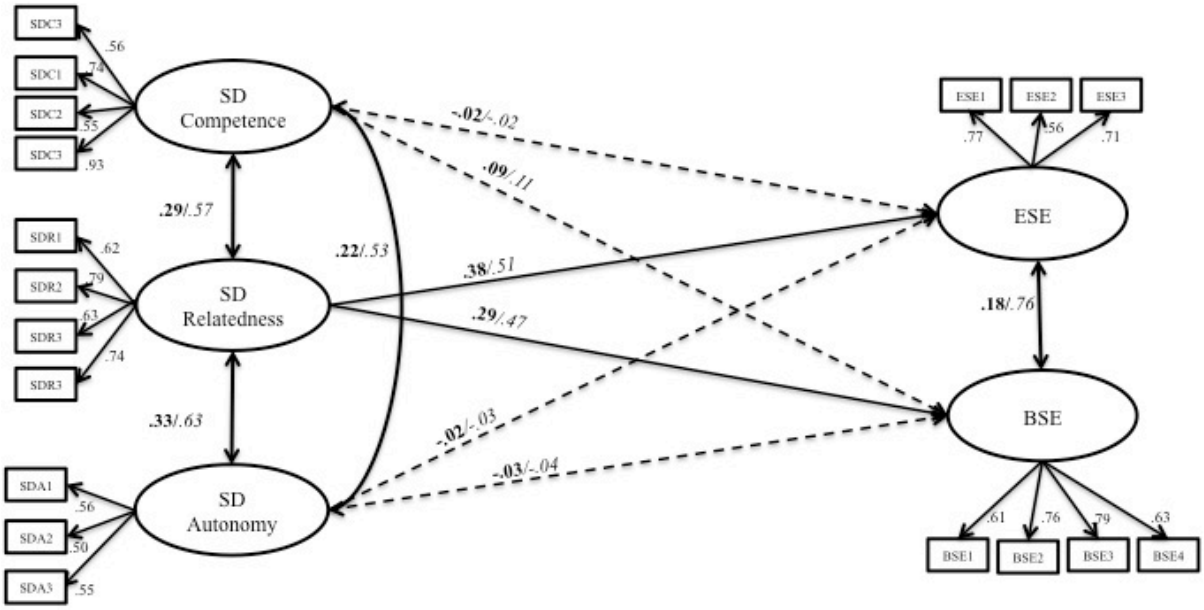

Figure 2. Multigroup Structural Equation Model (Teacher MT). Significant effects shown as unstandardized coefficients (B) in bold face and standardized coefficients (β) in italics. Factor loadings shown as standardized coefficients. Bold pathways are significant at $p < 0.05$; dotted pathways are not significant;

Note. SD = Self-Determination; ESE = Emotional School Engagement; BSE = Behavioral School Engagement;

Peer MT. The results of our analysis for the peer-dependent MT are shown in Figure 4. The model included direct paths from self-determination (competence, relatedness and autonomy)

to behavioral and emotional school engagement. Covariances were included for the associations between competence and relatedness ($r = 0.18$, $p < .001$), competence and autonomy ($r = 0.22$, $p < .001$), autonomy and relatedness ($r = 0.31$, $p < .001$). In addition, the covariance between behavioral and emotional school engagement ($r = 0.09$, $p < .001$) was found to be significant. In total, four significant direct effects were identified (see Figure 4): competence predicts emotional ($B = 0.26$, $\beta = 0.25$, $SE = 0.10$, $p = .011$) and behavioral school engagement ($B = 0.21$, $\beta = 0.28$, $SE = 0.08$, $p = .009$), as well as relatedness predicts emotional ($B = 0.29$, $\beta = 0.39$, $SE = 0.10$, $p = .004$) and behavioral school engagement ($B = 0.13$, $\beta = 0.23$, $SE = 0.06$, $p = .042$). This model explained about 48% of the variance in behavioral school engagement ($R^2 = .291$) and 29% of emotional school engagement ($R^2 = .292$).

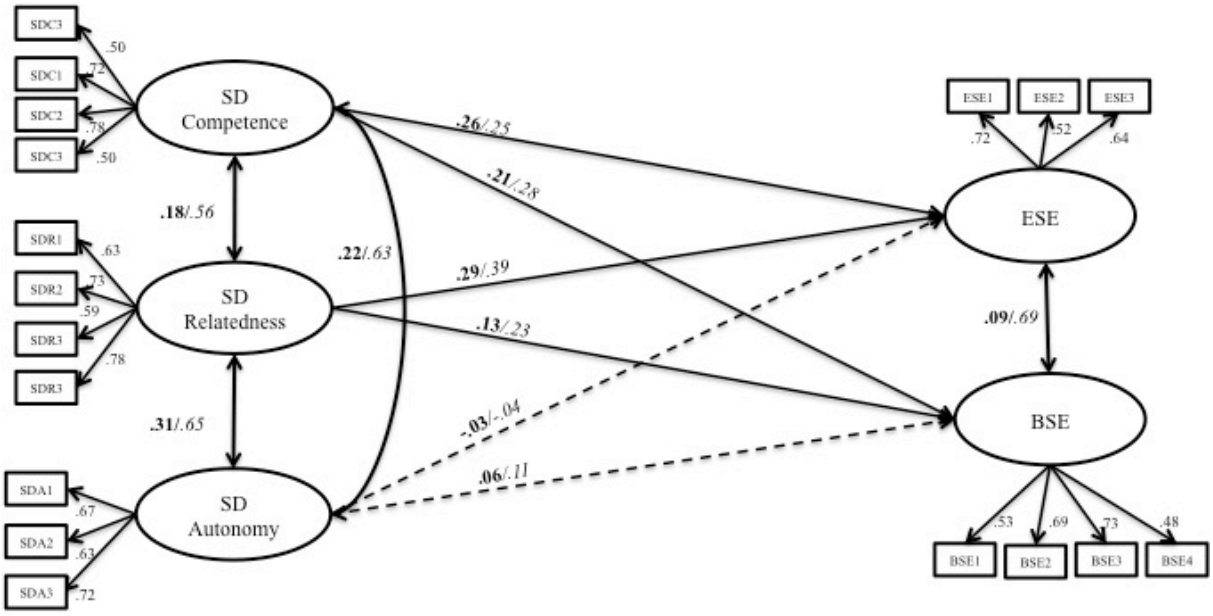

Figure 3. Multigroup Structural Equation Model (Peer MT). Significant effects shown as unstandardized coefficients (B) in bold face and standardized coefficients (β) in italics. Factor loadings shown as standardized coefficients. Bold pathways are significant at $p < 0.05$; dotted pathways are not significant;

Note. SD = Self-Determination; ESE = Emotional School Engagement; BSE = Behavioral School Engagement;

Independent MT. The results of our analysis for the peer-and-teacher-independent MT are shown in Figure 5. The model included direct paths from self-determination (competence, relatedness and autonomy) to behavioral and emotional school engagement. Covariances were included for the associations between competence and relatedness ($r = 0.27$, $p < .001$), competence and autonomy ($r = 0.27$, $p < .001$), autonomy and relatedness ($r = 0.42$, $p < .001$). In addition, the covariance between behavioral and emotional school engagement ($r = 0.14$, $p < .001$) was found to be significant. In total, two significant direct effects were (see Figure 5): competence predicts emotional ($B = 0.41$, $\beta = 0.44$, $SE = 0.11$, $p < .001$) and behavioral school engagement ($B = 0.25$, $\beta = 0.33$, $SE = 0.11$, $p = .019$). In contrast, neither relatedness nor autonomy functioned as predictors for the peer-and-teacher-independent MT. This model explained about 16% of the variance in behavioral school engagement ($R^2 = .159$) and 26% of emotional school engagement ($R^2 = .263$).

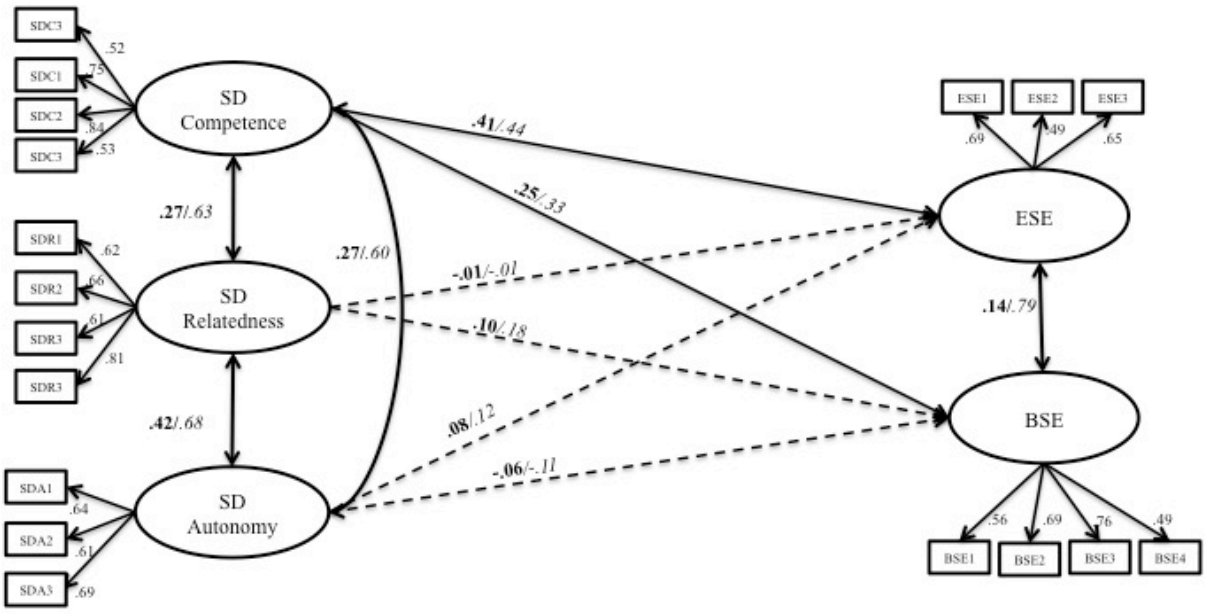

Figure 4. Multigroup Structural Equation Model (Independent MT). Significant effects shown as unstandardized coefficients (B) in bold face and standardized coefficients (β) in italics. Factor loadings shown as standardized coefficients. Bold pathways are significant at $p < 0.05$; dotted pathways are not significant;

Note. SD = Self-Determination; ESE = Emotional School Engagement; BSE = Behavioral School Engagement;

4.4 Discussion

In order to enhance our understanding of interindividual differences in scholastic motivation, the present study examined whether self-determination (competence, relatedness, autonomy support) predicts school engagement in four different motivation types (MT) of adolescent students: (1) peer-dependent MT, (2) teacher-dependent MT, (3) peer-and-teacher-dependent MT, (4) peer-and-teacher-independent MT. To our knowledge there have been no studies conducted thus far which have applied such a person-oriented approach to this topic. In support of the first hypothesis, it was found that the peer-and-teacher-dependent MT showed the highest mean values on competence and relatedness in comparison to all the other MTs. In contrast to our hypothesis, the peer-and-teacher-dependent MT endorsed the highest levels of autonomy as well. In other words, students of the peer-and-teacher-dependent MT perceive themselves as having more self-determination than the other three MTs. In contrast, the peer-and-teacher-independent MT and the teacher-dependent MT reported the lowest values on each of the three categories of self-determination. In other words, socio-motivational dependency seems to enhance one's perception of self-determination. Interestingly, students with a peer-dependency tend to perceive themselves as having higher self-determination than the teacher-dependent MT and the peer-and-teacher-independent MT.

It seems then that self-determination might be bolstered by interpersonal relationships (particularly with peers) meaning that students with a socio-motivational dependency benefit more in terms of self-determination and need satisfaction in comparison to the peer-and-teacher-independent MT.

In line with our first hypothesis and as the results of the latent mean comparison revealed, the peer-and-teacher-dependent MT showed more emotional and behavioral school engagement than the other three MTs. As daily school life is dominated by social interaction this MT's socio-motivational dependency is an asset and has positive effects on school engagement *and* self-determination. In contrast to our hypothesis, the teacher-dependent MT did not significantly differ from the peer-and teacher-dependent MT in their levels of behavioral school engagement. Furthermore, the peer-dependent and the teacher-dependent MT report almost the same values on emotional school engagement. In sum, the results indicate the following: whereas the peer-and-teacher-independent MT showed the lowest values on school engagement and self-determination, the peer-and-teacher-dependent MT showed the highest values, and the peer-and-teacher-dependent MT ranged between these two.

Drawing on SDT, these findings suggest that a social learning environment may not benefit the peer-and-teacher-independent MT with regards to their school engagement and need satisfaction. In other words, this MT may not experience the school context and the social relationships therein as stimulating of his/her school engagement or self-determination. In contrast, the peer-and-teacher-dependent MT showed the highest values on school engagement and perceived self-determination. These results suggest that this MT is well suited to the social learning environment characteristic of daily school life.

With the goal of bolstering each MT's school engagement according to type-specific associations with self-determination, a multigroup structural equation model was conducted. Based on the idea that a high perceived self-determination is associated with higher need satisfaction, which is in turn vital to one's enjoyment, personal growth, and well-being (Reeve, 2012; Jang, Reeve, Ryan, & Kim, 2009; Pfaeffli & Gibbons, 2010), the three aspects of self-determination (relatedness, autonomy, competence) were tested as predictors of emotional and behavioral school engagement. Contrary to our hypothesis, for two of the MTs only two aspects of self-determination functioned as a predictor of school engagement and for the other two MTs only one aspect of self-determination functioned as a predictor of school engagement. In general, the results of the SEMs ran contrary to what we had hypothesized. Based on differences in socio-motivational dependency, we assumed that for example relatedness would be a strong predictor of school engagement for the peer-and-teacher-dependent MT, whereas autonomy would be a stronger predictor for the more autonomous peer-and-teacher-independent MT. However, what we found was that competence and autonomy function as predictors of school engagement for the peer-and-teacher-dependent MT, relatedness functions as a predictor of school engagement for the teacher-dependent MT, relatedness and competence function as predictors of school engagement for the peer-dependent MT and finally, competence functions as a predictor of school engagement for the peer-and-teacher-independent MT. Taken together, the results suggest that the needs that students satisfy through self-determination are the ones which have not yet been satisfied through their socio-motivational dependency.

In general, the findings from the structural equation models highlight strong differences between the four MTs, which were underlined by the significant results of the Chi2 difference test between the semi-restricted and the fully restricted (without any group

difference) model. Although there are highly significant positive correlations between each aspect of self-determination and both dimensions of school engagement for each MT, only one aspect of self-determination was identified as a predictor of school engagement for the teacher-dependent and the peer-and-teacher-independent MT, and two aspects of self-determination were successful predictors of school engagement for the peer-dependent MT and the peer-and-teachder-dependent MT. Taken together, the findings suggest that students' need satisfaction (relatedness, competence, autonomy) in German schools may not be very high.

As SDT argues, social contexts that are characterized by high quality teacher and peer relationships can be a source of need satisfaction (Deci & Ryan, 2000), which leads us to the conclusion that perhaps the social relationships of the peer-and-teacher-independent MT are not very strong. This MT's needs of autonomy (i.e., supported through learning autonomy-supportive or student-centered teaching behaviors; Radel, Sarrazin, Legrain, & Wild, 2010; Roth, Assor, Kanat-Maymon, & Kaplan, 2007; Soenens & Vansteenkiste, 2005), competence (i.e., supported through teacher feedback and teaching style; Niemiec & Ryan, 2009) and relatedness (i.e., supported through strong peer and teacher relationships; Niemiec & Ryan, 2009) are difficult to satisfy as need satisfaction is based on feedback and lively interactions in a social context (Deci & Ryan, 2000). Nevertheless, competence was identified as a predictor of their school engagement, which means that teachers' feedback and teaching style might have significant practical implications if one aims to foster the school engagement of the peer-and-teacher-independent MT. For the peer-dependent MT the satisfaction of both relatedness and competence needs initiated and supported by teachers and peers, is essential to maintaining intrinsic motivation (Niemiec & Ryan, 2009). Interestingly, relatedness was the only significant self-determination predictor of school engagement for the teacher-

dependent MT. That means that supporting their relationships with both peers and teachers might be the most effective strategy to foster their school engagement. In contrast, the peer-and-teacher-dependent MT, who might perceive the satisfaction of relatedness through his/her socio-motivational dependency, benefits from satisfying his/her needs of competence and autonomy. This finding is in line with the results of Reeve, Jang, Carrell, Jeon and Barch (2004), who have shown that an autonomy-supportive teaching style enhances students' school engagement.

Taken together, each MT benefits from strengthening different aspects of their perceived self-determination. In other words, there seems to be an association between their socio-motivational dependency, perceived self-determination and school engagement.

Strengths, Limitations and Future Research

The data on which our conclusions are based have limitations. Firstly, this study employed a non-experimental cross-sectional design thus limiting the establishment of cause-effect relationships between the constructs investigated. In order to better capture the dynamic and interdependent processes in the development of the person-in-context (see Lerner, 1991) longitudinally, a second measurement point is scheduled for fall 2013. Secondly, our study is limited in its sole reliance on self-report measures. However, most studies, which have included teacher- and self-reports in motivation research, have reported low levels of concordance between information provided by multiple informants (see Skinner & Belmont, 1993). According to Wentzel, Battle, Russell and Looney (2010) there is evidence to suggest that teachers do not provide valid information concerning how students perceive their behavior. Furthermore, the focus of our study lies on students' subjective experiences of teacher and peer support and therefore a self-report strategy is warranted. Additionally, self-report measures have been shown to be a valid method in psychological research (Chan,

2009). Future research on the association between self-determination and school engagement, within the context of socio-motivational dependencies should include students from different age groups and school types (e.g., private, public) when assessing the quality of peer and teacher relationships. Longitudinal cross-cultural examination is also warranted, which should consider school-type and different socio-economic status.

Despite these limitations, the present study is unique in its person-oriented approach to scholastic motivation and self-determination and as such has added to the extant body of research by considering interindividual differences in students' evaluations of the roles peers and/or teachers play in motivation. In addition, findings indicate that the role of self-determination as a predictor of school engagement and different types of motivation was less pronounced than expected. Further research beyond the need-based perspective of this study is needed to evaluate the impact of other personal and environmental variables as sources of motivation, such as cognitions, emotions and environmental events (Reeve, 2012).

The findings provide a strong argument for the consideration of students' individual motivation patterns when designing curricula, general learning environments and improving existing intervention programs (e.g. Martin, 2007). We believe that there is an ongoing tendency in schools to expect students to learn and behave in uniform ways, which results in labeling nonconforming students as maladjusted instead of, as our research has shown, having different motivational needs. Currently, new educational concepts (i.e., mosaik secondary schools, edu-quest international inc.; Glaze, Matingley, & Levin, 2012) are emerging that frame the heterogeneity of students as a rewarding challenge, rather than a hindrance. With the increase use of individual learning tools, such as personalized learning schedules, learning diaries, learning journals (Glogger, Schwonke, Holzäpfel, Nückles, & Renkl, 2012) and

student-centered learning (MacLellan, 2008), students' motivation and engagement is beginning to be considered on an individual basis.

Taken together, these findings have clear practical implications for intervention program developers seeking to enhance key facets of interindividual differences in students' school engagement and motivation, they are also of interest to researchers seeking to assess the impact of self-determination on school engagement and different types of motivation.

4.5 References

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CHAPTER 5

Within the framework of a person-oriented approach, the main objective of this Ph.D. study was to investigate the interdependency between adolescent students' scholastic motivation and social relationships in school with a focus on interindividual differences. This cross-sectional investigation was conducted with a large sample (N=1088) of 7th and 8th grade students in Brandenburg, Germany.

5.1 Review of the main findings

Many studies have investigated the relationship between social relationships (teacher-student relationship, student-student relationship) and scholastic motivation, but only a few studies have considered both student-student relationship and teacher-student relationship within one investigation. Furthermore, all existing knowledge is based on the variable-oriented approach meaning that individuals are treated as equals statistically, although it is well-known that students' vary in their personal needs (Deci & Ryan, 2000), in their scholastic motivation (Mouratidis, Vansteenkiste, Sideridis, & Lens, 2011), and in the quality and quantity of their social relationships (Bukowski, Motzoi, & Meyer, 2009; Bukowski, Buhrmester, & Underwod, 2011; Raufelder, 2007).

With the aim of addressing this incongruity in the research literature, in STUDY I items were developed and validated that incorporate both social relationships and motivation into one scale as well as take into consideration that individuals learn and are motivated in different ways. Based on Lerner's developmental contextualism theory (Lerner, 1986, 1991, 1992, 1998), it was proposed that both student-student relationships and teacher-student relationships are essential on three levels: (a) personal development, (b) scholastic motivation and (c) academic achievement. These levels must be understood as part of the interconnected

and interdependent processes characteristic of students' experiences in the school context. Therefore, information from both the motivation and the social relationships in school literatures, as well as aspects of developmental psychology were included in the development of the Relationship and Motivation (REMO) scales. By using a three-stage approach the factor structure underlying the 37 REMO items was determined: exploratory factor analyses, confirmatory factor analyses and multilevel confirmatory factor analyses confirmed a two-factor solution for the teacher items and a three-factor solution for the peer items, with acceptable internal consistency. The Peer-REMO scales (P-REMO) consisted of three peer factors: Peers as Positive Motivators (PPM), Peers as Negative Motivators (PNM), and Individual Learning Behavior (ILB). The Teacher-REMO scales (T-REMO) consisted of two teacher factors: Teachers as Positive Motivators (TPM) and Teachers as Negative Motivators (TNM).

In general, the findings have shown that the REMO scales provide a robust assessment of a student's experiences of peers and teachers as motivators in the school context. Specifically, the associations between the quality of the peer and teacher relationships and academic achievement motivation and achievement goal orientation are the most salient of the findings. According to the results of bivariate correlations between the REMO scales and independent measures of academic achievement motivation and achievement goal orientation, the more students perceive peers and teachers as positive motivators, the higher their scores on achievement drive, learning goals, striving for academic success and avoidance of academic failure. These findings are in line with variable-oriented results indicating that for many adolescent students positive social relationships in school support academic achievement motivation and achievement goal orientation (Wentzel, 1998; Wentzel et al., 2010). In contrast, the results of the bivariate correlations have also shown that students who perceive

their peers and teachers as negative motivators tend to endorse negative attitudes about academic achievement motivation and achievement goal orientation. Furthermore, students with high scores on individual learning behavior, tend to not need peers or teachers as motivators at all, and do not avoid academic failure. In other words, the results of the development and validation of the REMO scales indicate interindividual differences in the associations between social relationships and motivation.

Taking the person-oriented approach, one main goal of this dissertation was to focus on interindividual differences in the roles teachers and peers play in students' scholastic motivation. As such, STUDY 2 examined whether students differently rely on students and/or teachers as sources of motivation. A confirmatory latent class analysis (CLCA) was conducted and identified four different motivation types (MTs): (1) teacher-dependent MT, (2) peer-dependent MT, (3) teacher-and-peer-dependent MT, (4) teacher- and peer-independent MT. Membership for this 4-class solution was as follows: 9.5% teacher-dependent MT (50 girls, 57 boys), 36.5% peer-dependent MT, (233 girls, 161 boys), 27.8% teacher-and-peer-dependent MT and (166 girls, 126 boys), and 26.3% teacher-and-peer-independent MT (138 girls, 157 boys). That means, that there is a huge group of students (26.3 %), who do not need students or teachers to be motivated. These students might benefit from a more autonomous learning environment. In contrast, almost the same amount of students perceived peers as well as teachers as important sources of motivation. For this "super-social" type, motivation might vary as a function of their social climate. In other words, for these students stable social relationships with both peers and teachers might be a pre-condition for the development of positive scholastic motivation. The peer-dependent MT (36.5%) was the biggest group, whereas the teacher-dependent MT was the smallest group. The membership distributions of both groups underline the increasingly important role of

peers during adolescence in many aspects of personal development, including motivation (Brown, 1990; Brown & Theobald, 1999; Cook, Deng, & Morgano, 2007; Fend, 1998; Savin-Williams & Berndt, 1990). In general, the results of STUDY 2 confirm the existence of interindividual differences in the interplay of scholastic motivation and social relationships in adolescent students. In particular, the information the typology provides can be used to support each student individually within the classroom setting.

The principle aim of STUDY 3 was to further our understanding of the four identified motivation types. Grounded in self-determination theory (SDT), the study examined in a first step differences in self-determination and school engagement between the four types. The results of the latent group comparison showed that the peer-dependent MT and the teacher-dependent MT as well as the peer-and-teacher-independent MT showed lower school engagement, perceived less self-determination in comparison to the peer-and-teacher-dependent MT (reference group). In a second step, based on self-determination theory (Deci & Ryan, 1985), we expected to identify self-determination as a predictor of school engagement and therefore as an effective starting point to support the four MTs individually. But contrary to expectation, the results of the multigroup structural equation model showed that the needs that students satisfy through self-determination are the ones, which have not yet been satisfied through their socio-motivational dependency. In other words, competence and autonomy function as predictors of school engagement for the peer-and-teacher-dependent MT, relatedness functions as a predictor of school engagement for the teacher-dependent MT, relatedness and competence function as predictors of school engagement for the peer-dependent MT and finally, competence functions as a predictor of school engagement for the peer-and-teacher-independent MT. In conclusion, the results underline an interesting interplay between the socio-motivational dependency, self-determination and school engagement.

Additonally, these findings from STUDY 3 highlight once more the essential role of interindividual differences in students' motivation and school engagement. Not only does the role peers and teachers play for adolescents' motivation differ in the group of adolescent students, need satisfaction through self-determination and its implications for motivation and school engagement also provide strong evidence of interindividual differences within the sample. In other words, interindividual differences are at the heart of motivation and learning processes in adolescence and to date remain underexamined in daily school life.

5.2 Theoretical and practical implications

5.2.1 Towards more person-oriented methods in motivation research

While current motivation research relies predominately on the variable-oriented approach, which continues to be the dominant approach in the field of psychology (Bergman, & Anderson, 2010), the present work is the first of its kind to investigate interindividual differences in adolescent students' motivation and social relationships by following a person-oriented approach.

Although early philosophers and humanists emphasized the need to identify students' interests, adapt instruction to individual needs and differences and the advantages of using self-comparisons rather than competitive social comparisons in evaluations of student's work and progress (Woolfolk, 2001), motivation research is still dominated by the variable-oriented approach and most school systems are still organized around competitive values. Additionally, we as psychologists should know that any two human beings, even identical twins, might respond and behave quite differently to the same stimulus (Hampson & Coleman, 1995). Each person is characterized by a unique profile, abilities and challenges, which result from learning and their unique developmental history. These manifest as

interindividual differences in among other things, intelligence, creativity, cognitive style, motivation, the capacity to process information, communicate, and relate to others (Woolfolk, Winne, & Perry, 2006). One could argue then that the study of interindividual differences should be at the heart of motivation, learning and teaching research as well as integral to the discipline of psychology, but instead we find that the variable-oriented approach is omnipresent.

The results of our confirmatory latent class analysis (CLCA) have shown without a doubt that at least when it comes to motivation, students differentially rely on peers and teachers as sources of motivation. Furthermore, these differences are striking, such that one motivation type (peer-and-teacher-dependent MT) can be understood as the opposite of another (peer-and-teacher-independent MT). In other words, some students rely heavily on peers and teachers for motivation, and others seem to not rely on these social relationships as sources of motivation at all. Furthermore, the four identified motivation types also differ in their self-determination as well as in their school engagement.

5.2.2 Practical implications for school context

Although Crow and Crow asserted as early as 1973 that schools should provide "schooling for every learner no matter how much he differs from every other learner" (Crow & Crow, 1973, p. 215), many schools still expect students to learn and behave in uniform ways. This imposed uniformity can result in students who do not fit this pattern being viewed as maladjusted or declared as having learning difficulties. Alternatively, the results of this person-oriented study have shown that these students might simply have different motivational needs, which might not be fulfilled or only partially fulfilled in current school system. We have also seen that their need satisfaction through self-determination are higher

for the peer-and-teacher-dependent MT in comparison to the peer-and-teacher-independent MT, which affect their school engagement. Secifically, the peer-and-teacher-independent MT seems to be disadvantaged in comparison to the other three MT in the current school system that is based on social interactions. At this point it is important to note that the motivation types (see chapter III) should not be understood as fixed labels, as this would inhibit our ability to see an individual as a dynamic system. Instead, the typology should be understood as an instrument to be used to support and enhance students on an individual basis. Teachers and educators as well as parents and students themselves can use the knowledge about the specific types (e.g., being a peer-dependent MT) to improve motivation, learning and teaching processes in the classroom and at home. For example, school-based mentoring programs could be used to improve each motivation type separately. Adult-student mentoring could be effective for the teacher-dependent motivation type, but also for the peer-and-teacher-dependent motivation type, who might profit from adult support other than a teacher. In contrast, the peer-dependent motivation type and the peer-and-teacher-dependent motivation type would most benefit from peer-mentoring or peer-assisted learning (Topping & Ehly, 2001; Topping, 2003; Mastropieri, Scruggy, & Berkeley, 2007). Studies convincingly demonstrate that mentoring programs have positive effects on school adjustment (e.g., achievement, academic self-concept) and promote the social and emotional well-being and development of youth in several ways (Rhodes, Spencer, Keller, Liang, & Noam, 2006; Wang & Odell, 2002). Additionally, mentoring relationships have the potential to provide youth with positive experiences with social relationships, which may lead to improvements in other important relationships (Keller, 2005; Rhodes, Spencer, Keller, Liang, & Noam, 2006).

Fortunately, new educational concepts and techniques, such as personalized learning schedules, learning diaries, learning journals (Glogger, Schwonke, Holzäpfel, Nückles, &

Renkl, 2012) and student-centered learning (MacLellan, 2008), are becoming more and more prevalent in schools. In addition, more schools are approaching student diversity and heterogeneity as a rewarding challenge, rather than a hindrance. In general, the findings provide a strong rationale for considering students' individual motivation patterns and personality traits when designing curricula, general learning environments and improving existing intervention programs (e.g. Martin, 2008).

5.3 Future directions

The studies presented in this dissertation are based on cross-sectional data, which does not allow for firm conclusions about the causal ordering of variables. A longitudinal design with two or more measurement points would be preferred in order to extend our knowledge of interindividual differences through an examination of intraindividual differences following Lerner's Developmental Contextualism. With this in minds, we have already begun collecting data for the study's second measurement point. We hope to determine the stability students' membership in each motivation type over time. Furthermore, a cross-cultural comparison with a sample in Montréal (Canada) has been conducted to test if the typology is generalizable across cultures. Differences between the Canadian and the German sample are expected, which would be valuable information for the improvement of school settings in both countries.

Additionally, the work of Jagenow, Raufelder and Eid (2013) has identified differences in academic motivation between the four types such that the peer-and-teacher-dependent MT demonstrated the highest values of achievement drive and intrinsic motivation and was more likely to demonstrate knowledge and skills in challenging situations compared to all other MTs. Comparatively, the peer-and-teacher-independent MT showed the lowest values of

achievement drive, intrinsic motivation, and performance-approach goals compared to all others MTs. The peer-dependent MT and the teacher-dependent MT did not differ on any of the measured motivation variables. In other words, whereas the peer-and-teacher-dependent MT benefits the most from the present school system, which is built around social relationships, the peer-and-teacher-independent MT might be disadvantaged for this very reason. As a result, initiatives aimed at students' strengthening should not only target social relationships but rather should attempt to tease apart the interindividual differences in motivational needs and apply this knowledge to curricula and daily school life. In other words, identifying different motivational needs as well as different learning and teachings styles might help support our four MTs individually.

Continued research on this typology, including for example investigations of student characteristics (such as being a hard worker, being involved, being trustworthy etc.), personality, and differences between low- and high-achievers is needed. The overall study follows a methodtriangulative approach and uses behavioral, cognitive as well as biological (neuronal) methods. Currently, FMRI studies and qualitative interviews are being conducted in order to get more detailed understanding of the typology.

In summary, the present Ph.D. study extends the existing research on motivation and social relationships in adolescent students by investigating interindividual differences. The findings provide clear evidence that interindvidual differences are at heart of motivational processes in adolescence. Additionally, the results underscore Molenaar's imploration to consider interindividual differences and as such re-introduce the individual into psychological research. In this way, individuals might be regarded as dynamic systems (Bergman & Andersson, 2010), as organized wholes (Magnusson, 1990), functioning and developing differently from other individuals (Bergman & Magnusson, 1997).

5.4 General conclusions

The results of studies I, II and III permit the following conclusions to be drawn:

- There are interindividual differences in the meaning of peers and teachers in their role as motivators for adolescent students (7^{th} and 8^{th} grade), which should be considered within the school context by different learning environments, tasks and ways of instructions and support. The diversity of students should be understood as a benefit rather than a deficit (Study II and III).
- The different role peers and teachers play for adolescents' scholastic motivation is associated with different degrees of academic achievement motivation and achievement goal orientation, which again underlines interindividual differences in adolescent students' motivation (Study I).
- Four different motivation types (MT) in adolescent students can be distinguished: (1) peer-dependent MT, (2), teacher-dependent MT, (3), peer-and-teacher-dependent MT, (4) peer-and-teacher-independent MT. The typology indicates that adolescent students tend to be socially motivated in specific ways. The knowledge about the typology can be used to improve student's learning by understanding and building on their individual motivation type. (Study II and III).
- The four types distinguish in the interplay of self-determination and school engagement: (1) competence and autonomy function as predictors of school engagement for the peer-and-teacher-dependent MT, (2) relatedness functions as a predictor of school engagement for the teacher-dependent MT, (3) relatedness and competence function as predictors of school engagement for the peer-dependent MT and finally, (4) competence functions as a predictor of school engagement for

the peer-and-teacher-independent MT. Taken together, the results suggest that the needs that students satisfy through self-determination are the ones which have not yet been satisfied through their socio-motivational dependency (Study III).

- The results of Study II and III underline not only the meaning of interindividual differences in the association between social relationships and motivation. Additionally, the results confirm the words of Boekaerts (2001) that there is still much to learn about individual preferences when it comes to motivational aspects (Study II and III).

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6. Appendix

6.1 The REMO-Scales

Items P-REMO

Peers as Positive Motivator

1. I like to make an effort at school because my friends then tell me that I am clever.
2. It is easier to do well in school when friends motivate me.
3. When my friends learn, I am also motivated to learn more.
4. When my friends want to improve at school, I also want to do better.
5. I make an effort at school when my friends motivate me.
6. At school I try to make a similar effort to that of my friends.
7. My friends and I motivate each other to make an effort at school.
8. Because of my friends, I try to make more of an effort at school.
9. I will study harder for an exam when my friends tell me that they are also working hard.

Peers as Negative Motivator

1. My friends pay me more attention when I make less of an effort at school.
2. If my friends were not interested in school, I also would not make an effort.
3. My friends encourage me to spend as little time as possible on schoolwork.
4. At times, I do not make an effort at school because my friends say that it is uncool to try.
5. If my friends were to say that good grades do not matter, I would study less.
6. When my friends find school boring, I also tend to find school tiresome.

Individual Learning Behavior

1. I can learn better on my own as compared to when I work with others.
2. Studying for a test is easier when my friends and I work together. (-)
3. When an exam is approaching, I prefer to study on my own.
4. I never do my homework with friends, I always do it on my own.
5. It is easier to succeed at school when you work on your own rather than with others.
6. I learn best when I work together with my friends. (-)

Items T-REMO

Teacher as Positive Motivators

1. When a teacher helps me, I try to do well in the subject.
2. When a teacher takes her/his time to explain something to me, I will make more effort the next time.
3. When a teacher notices that I have tried my best, I will try to give my best again in the future.
4. I will make more of an effort in a subject when I think the teacher believes in me.
5. A teacher's enthusiasm in a subject matter motivates me to learn more.
6. When a teacher likes me, I make more effort in the subject.

Teacher as Negative Motivator

1. When I do not like a teacher, I am not interested in the subject.
2. When I think the teacher does not believe in me, I don´t make an effort to do well.
3. When I don´t like a teacher, I get tired of the subject.
4. When a teacher doesn´t notice that I am making an effort, I stop trying.
5. If a teacher never gives me a good grade in a subject, I stop caring about how I do in that subject.
6. When a teacher does not try to help me, I usually give up.
7. Whether I like or dislike a teacher has influence on how much I learn.
8. When I think a teacher does not like me, I have trouble being inspired by the subject.
9. When a teacher bores me, I do not learn anything at all.
10. When a teacher is not interested, I cannot be interested.

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8. Lebenslauf

For reasons of data collection,

the curriculum vitae is not included in the online version

9. Deutsche Zusammenfassung der Ergebnisse

Auf Grundlage der Ergebnisse der empirischen Studien I, II, III lassen sich folgende Schlussfolgerungen ziehen:

- Es gibt interindividuelle Unterschiede in der Bedeutung von Peers und Lehrern/-innen in ihrer Rolle als Motivatoren für adoleszente Schüler/-innen (7te und 8te Klasse), die im Schulkontext mittels unterschiedlicher Lernumgebungen, Aufgaben und Unterstützung entsprechend Berücksichtigung finden sollten. Diese Diversität der Schülerschaft sollte mehr als Bereicherung als als Hindernis verstanden werden (Studie II und III).
- Die unterschiedliche Rolle, die Peers und Lehrer/-innen für die schulische Motivation adoleszenter Schüler/-innen spielen, ist mit unterschiedlichen Graden von Leistungsmotivation und Leistungszielorientierunng verbunden, was wiederum die Existenz interindividueller Unterschiede in der Motivation jugendlicher Schüler/-innen unterstreicht (Studie I).
- Es können vier unterschiedliche Motivationstypen (MT) adoleszenter Schüler/-innen unterschieden werden: (1) peer-abhängiger MT, (2), lehrer-abhängiger MT, (3), peer-und-lehrer-abhängiger MT, (4) peer-und-lehrer-unabhängiger MT. Die Typologie impliziert, dass adoleszente Schüler/-innen dazu tendieren in unterschiedlicher Art und Weise sozial motiviert zu sein. Das Wissen um diese Typologie kann dazu genutzt werden die Lenrprozesse der Schüler/-innen zu verbessern, indem Lehr- und Lenrprozesse an Hand des je individuellen Motivationstyps ausgerichtet werden (Studie II und III).
- Die vier Motivationstypen unterschieden sich im Zusammenspiel von Selbstbestimmugserleben und Schulengagement: (1) Kompetenz und Autonomie

fungieren als Prädiktoren von Schulengagement für den peer-und-lehrer-abhängigen MT, (2) soziale Eingebundneheit fungiert als Prädiktor von Schulengagement für den lehrer-abhängigen MT, (3) soziale Eingebundneheit und Konpetenz fungieren als Prädiktoren von Schulengagement für den peer-abhängigen MT und schließlich, (4) Kompetenz fungiert als Prädiktor von Schulengagement für den peer-und-lehrer-unabhängigen MT. Zusammengefasst lässt sich sagen, dass jeweils diejenigen Bedürfnisse der Schüler/-innen als Prädiktoren von Schulengagement fungieren, die noch nicht durch die motivationale Abhängigkeit der Schüler/-innen (Typenzugehörigkeit) befriedigt werden (Studie III).

- Allgemein verdetulichen die Ergebnisse der Studie II und III einmal mehr die Bedeutung interindividueller Unterschiede im Zusammenspiel von sozialen Beziehungen und Motivation. Darüber hinaus, bestätigen die Ergebnisse Boekarts (2001) Postulat, dass es noch viel über individuelle Vorlieben in Hinblick auf motivationale Aspekte zu lernen gibt (Studie II und III).