Measuring Motivational Concepts and Personality Aspects in the National Educational Panel Study

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Abstract

This chapter outlines the use and measurement of motivational concepts and personality aspects in the German National Educational Panel Study (NEPS). The selection of concepts combines elements that prevalent motivation and personality theories have in common, thereby promoting research from different theoretical perspectives. The constructs measured are learning motivation and effort, personal goals and goal pursuit, general interest orientations, topic-related interests, self-concept (both general and domain-specific), personality aspects, and selected social skills and parenting behavior dimensions. These theoretical constructs and their corresponding measurements presented in this chapter were chosen on the basis of their applicability across

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the complete life course. Within NEPS, this integrated compilation of motivational concepts and personality aspects improves our understanding of educational processes and competence development from infancy to late adulthood.

Keywords
Education · Panel study · Motivation · Personality

9.1 Introduction

Educational processes and competence development across the life course depend heavily on motivational concepts and personality aspects. The National Educational Panel Study (NEPS) raises some challenges connected with these concepts. The concepts to be included in the design (see Chap. 1, this volume) have to be selected carefully. Different facets of motivational concepts (in the broadest sense) and personality can be considered when investigating educational processes and the development of competencies. A well-founded selection is needed, because of the extensive number of items usually found within the available instruments and the broad variety of concepts in this field of research. Moreover, measuring these concepts is a particular challenge because they not only form an interdisciplinary research field but also have to be measured from childhood to adulthood.

A number of motivational and personality factors can be disentangled within the framework of educational processes and competence development. Some of these are quite stable; others are more variable and situation-adaptive. When selecting concepts to be included in NEPS, we integrated the different research traditions and interests of psychologists, educational scientists, sociologists, and economists. Although motivational concepts and personality aspects relate substantially to each of the other five central NEPS dimensions (see Chaps. 4–8, this volume), this topic constitutes its own research field within NEPS.

Many different framework conceptions deal with how motivational concepts and personality aspects relate to educational performance and processes of life-long learning: the expectancy-value theory of achievement motivation (Wigfield and Eccles 2000), the motivational theory of life-span development (Heckhausen et al. 2010), self-determination theory (Deci and Ryan 1985), or self-efficacy theory (Bandura 1997)—to name but a few. Due to the quantity of work in this area, there is a plurality of concepts that all use related terms and similar instruments (see, for a detailed overview, Eccles and Wigfield 2002). For NEPS, we selected some common main components of multiple theoretical perspectives in order to guarantee a wide variety of possible uses of these concepts in different disciplines. This also makes it possible to compare different theories and untangle how they relate to each other.

Among both psychologists and educational scientists, one of the currently most popular motivational theories is expectancy-value theory from Wigfield and Eccles (2000).

This theory posits that decisions are based on a set of influences: on the one hand, ability beliefs defined as "the individual's perception of his or her current competence at a given activity"; on the other hand, expectancies for success defined as persons' "beliefs about how well they will do on upcoming tasks" (Wigfield and Eccles 2000, p. 70). These two basic components are then combined with different task-value components (see Wigfield and Eccles 2000): attainment value (how important succeeding in this activity is to the individual), intrinsic value (how much joy the individual gets from performing the task or how much interest the individual has in it), utility value (how well a task corresponds to short- and long-term goals), and cost (the negative aspects that emerge when performing an activity). Other models (e.g., Bandura 1997; Hidi et al. 2004) include different contributory factors such as ability or academic self-concepts, interests, and achievement goals.

For the purposes of NEPS, following the central ideas of Eccles and Wigfield's (2002) framework offers the chance to include various common features from different theoretical perspectives. Integrating this cross section of characteristics from varying approaches into our study allows us to choose various applications from several theoretical orientations and to combine elements of different models. The following sections will describe the motivational and personality components measured in NEPS.

9.2 Motivation

9.2.1 Learning Motivation and Effort

According to Deci and Ryan (1985), motivation can be divided generally into two components: intrinsic motivation defined as a "motivation to engage in an activity for its own sake," and extrinsic motivation defined as "motivation to engage in an activity as a means to an end" (Pintrich and Schunk 2002, p. 245). Depending on the theoretical framework, extrinsic motivation can be broken down into further facets. For example, Schiefele et al. (2002) distinguish performance-related, competition-related, and job-related extrinsic motivation. Selecting an adequate instrument to measure learning motivation within NEPS is a challenging task for several reasons such as the limited measurement time or the task of measuring motivation across the life course. Schiefele et al.'s (2002) scale met all our needs for students in university, but had to be adjusted slightly to measure learning motivation in school and during the apprenticeship phase. During the stage of adulthood, we intended to implement a measure on learning motivation in the context of further education and advanced training.

In addition to learning motivation, students' effort is being assessed in Starting Cohorts 3 and 4, because part of the shock caused by PISA was a lack (or at least insufficient amount) of students' effort besides other factors such as school quality. The items implemented in NEPS were developed on basis of an instrument from the Pythagoras study (Rakoczy et al. 2005). Three dimensions of effort are available in the data: effort in school in general, subject-specific effort in mathematics, and subject-specific effort in German.

9.2.2 Personal Goals and Goal Pursuit

Starting in Grade 8, the assessment of motivation is being supplemented by the measurement of *personal goals*. Because a large proportion of students leave the school system after Grade 9 or 10 in order to start vocational education and training, work aspirations are of outstanding relevance. Therefore, the measurement of the *meaning of work* adds an important aspect to the bundle of motivational concepts. Suitable scales are, on the one hand, an adaptation of the *work aspirations* instrument used in the TOSCA study (Transformations of the Secondary School System and Academic Careers; cf. Köller 2004) and, on the other hand, the *desired work conditions* instrument from the MOW International Research Team (1987). Both measures cover slightly different subdimensions such as extrinsic orientation (cf. Trautwein et al. 2006) or economic aspects (cf. Borchert and Landherr 2007).

Another facet of personal goals is the field of work-related and private goals. Over the life course, individuals have to struggle with different challenges such as important transitions (e.g., from school to work or to further education) or life events (e.g., family formation or unemployment). These are often combined with certain time windows for the achievement of such personal goals. According to the motivational theory of life-span development, different motivational and self-regulatory strategies are needed to deal with these challenges (Heckhausen et al. 2010). Therefore, NEPS provides—in cooperation with Jutta Heckhausen—two 12-item scales for these strategies (differentiable in goal disengagement and goals disengagement strategies) in the key domains of work life and the private sphere. In Starting Cohorts 4, 5, and 6, the individual work-related and private goals are assessed in an open question format. In the data, there are coded formats as well as the open answers available for both key domains, thereby providing manifold options for answering research questions and performing data analyses.

Another important component in motivation research is *goal pursuit*. During school life, every student has to deal with positive and negative consequences for her or his learning behavior in the form of school grades. Even more influential are students' experiences after major educational decisions such as the choice of school type. According to Brandtstädter and Renner (1990), coping with results of changes can follow two alternative strategies: adjusting personal goals to given situations ("accommodative coping") versus adjusting the environmental circumstances to the individual preferences ("assimilative coping"). Life-course researchers have recognized a shift from assimilative activities in early life stages to accommodative behavior in later life (see Brandtstädter and Rothermund 2002). NEPS provides an outstanding framework for monitoring this shift over the complete life span. Moreover, it offers the opportunity to start observation at very early ages and thus deepen our understanding of the underlying processes. Conversely, the measurement of these strategies contributes to the motivational concepts in terms of allowing for a different account of the above-mentioned motivational theories. Therefore, we integrate two short versions of scales developed to measure the two coping strategies: the *Tenacious Goal Pursuit* and the *Flexible Goal Adjustment* scales (Brandstädter and Renner 1990).

9.3 Interests

The development and stabilization of individual *interests* both inside and outside of school is a topic of major importance for educational scientists (see, e.g., Daniels 2008; Krapp 1992; Todt 1978). Interests are closely connected to intrinsic motivation and always aim at a specific content (see Krapp 1999).

9.3.1 General Interest Orientations

An internationally recognized model conceptualizing *general interest orientations* is Holland's (1997) hexagonal model. This is based on the differentiation of six interest and commensurate environment types (see Bergmann and Eder 2005):

- Realistic type (R): prefers activities that include the explicit and systematic manipulation of objects, tools, machines, or animals.
- Investigative type (I): favors activities that can be characterized by an observing, symbolic, systematic, and creative investigation of physical, biological, or cultural phenomena.
- Artistic type (A): prefers ambiguous, open, and unsystematic activities that imply the manipulation of physical, verbal, or human materials to create artistic forms and products.
- Social type (S): prefers activities to inform, train, educate, cure, or advise other people.
- Enterprising type (E): favors activities that include the manipulation of other people to achieve organizational goals or to gain economic returns.
- Conventional type (C): prefers activities characterized by the explicit and systematic manipulation of data to gain organizational or economic returns.

Those six ideal types can be arranged in a preference order to form an individual interest profile. A total of 720 interest patterns can be differentiated by combining these six types. According to their intercorrelations, the six types are arrayed in a circumplex or hexagon (Holland and Gottfredson 1992). These relations are reflected by the acronym RIASEC, which is therefore often used as a synonym for Holland's (1997) interest model. A central concept within the model is congruence. People especially select environments that are congruent to their interests and they change (or leave) incongruent environments.

In order to measure RIASEC interests, NEPS has developed a new instrument (IILS; Interest Inventory Life Span, with a child and an adult version). It is based on the following inventories: (a) a German (30-item) version of the Inventory of Children's Activities–Revised (ICA-R) from Tracey and Ward (1998), German version ICA-D from von Maurice (2006) that has been developed and tested for elementary school age

(von Maurice and Bäumer 2014); (b) the (60-item) Allgemeiner Interessen-Struktur-Test in its revised edition (AIST-R; Bergmann and Eder 2005) that can be used from 14 years of age onward. To measure general interest orientations over the life course, these instruments have been shortened and combined in NEPS: In the child version of the IILS (from Grade 4 to Grade 8), we chose two items from the ICA-D and one item from the AIST-R per scale; in the adult version of the IILS (from Grade 9 to adulthood), we used one item from the ICA-D and two items from the AIST-R per scale. Item selection was based on empirical analyses and plausibility checks. Consequently, a very short 18-item instrument for measuring the six Holland-scales R, I, A, S, E and C is available in both versions.

Although the RIASEC model allows us to conceptualize general interest orientations over the life course, it is best suited for the domain of work. The integration of Holland's model in NEPS offers a great potential for many educational researchers because of its cross-cultural relevance.

9.3.2 Topic-Related Interests

In school studies, the measurement of interests is often oriented toward measuring interest in the respective school subject. This approach is insufficient for NEPS, because it is following individual development over the entire life span. After students have left school, subject-specific measurement seems rewarding only when another school-similar context follows that is also arranged in subjects (e.g., university). Hence, it is advisable to avoid gathering this information in a school-subject-oriented way (subject-related interest; German term '*Fachinteresse*'), but to use a different approach and ask for more general interest fields independently from school subjects (see Daniels 2008). Focusing on *topic-related interests* (German term '*Sachinteresse*') enables us to use the same instrument across school stages as well as after finishing school. This makes it possible to analyze topic-related interests over different stages (see Chap. 1, this volume). Similarly, NEPS Pillar 1 covers competence domains not in close relation to a curriculum but in a more general, naturalistic way (see Chap. 4, this volume).

Throughout the whole of NEPS, one particular focus is on the subjects German and mathematics. Accordingly, subject teachers are being interviewed during the school stages in addition to the target persons (see Chap. 13 this volume). In analogy to this characteristic, the measuring of interest should include at least the two domains German and mathematics in order to allow research on the interdependence of interests, other motivational components, and school achievement. For this reason, we capture topic-related interests in the two domains German and mathematics. Using items taken from a study by Baumert et al. (2003), we are able to implement the same instrument across the whole life course.

The life-span perspective implemented in NEPS provides an important opportunity to study individuals' development of interests. Because interests are known to have

profound consequences for human (choice) behavior (see Nagy et al. 2006), knowing whether interests do or do not "crystallize" across the life span is an important step in understanding the development of individuals' behavioral plasticity.

9.4 Self-Concept

Self-concept is a major indicator for achievement and is of central importance in current educational research (see Bong and Clark 1999; Helmke and van Aken 1995; Kaufmann 2008; Shavelson and Bolus 1982; Wohlkinger et al. 2016). It can be defined as a person's perception of her- or himself and her or his abilities (see Marsh and Shavelson 1985; Shavelson et al. 1976; Watermann et al. 2010).

Theoretically, the structure of NEPS suggests a quite differentiated recording of self-concept: On the one hand, there are the school stages and their obvious close connection to school subjects. On the other hand, there are university students with an environment that is not structured by subjects as in school, but shaped by topic-oriented courses. And finally, there is the domain of working people, whose environment is no longer arranged in an explicit structure with regard to contents (though it should be noted that occupational environments can be described in terms of the RIASEC model, especially in comparison to general interest orientations, thus allowing us to examine, e.g., vocational decisions or person–environment fit). Therefore, it seems a challenging task to measure the self-concept across all stages in an identical way. However, because the self-concept is characterized by a hierarchical structure (see, e.g., Lichtlein 2000; Marsh 1987; Marsh and Shavelson 1985; Shavelson et al. 1976), it is possible to realize a consistent capture as well as a differentiating measure of the theoretical construct—as the following section will show.

9.4.1 General Self-Concept

The hierarchy of the self-concept provides a particularly convenient possibility of differentiating measurement throughout NEPS: Across the life course, the general self-concept—a dimension that is explicitly not connected to any domain such as school, university, or work—can be measured in exactly the same way at all stages. This provides the advantage of being able to compare different age groups to each other and monitor the development and stability of the general dimension of self-concept throughout the life course.

Among the conceivable measures, the Rosenberg Self-Esteem Scale (Rosenberg 1965) seems to fulfill the requirements, because self-esteem forms the main element of self-concept (see Ferring and Filipp 1996). Concretely, our choice from among the available German instruments was the revised *Self-Esteem Scale* from von Collani and Herzberg (2003a). As in the original version by Rosenberg (1965), this scale includes positive as

well as negative facets and offers good psychometric properties in terms of reliability and validity (von Collani and Herzberg 2003a, b). These results were affirmed in two NEPS developmental studies for Grade 5 students and for university students in whom the self-esteem scale was also tested. Furthermore, the scale is very economical with only 10 items, thus meeting the needs of a large-scale survey study such as NEPS.

9.4.2 Domain-Specific Self-Concept

At the school stages, measurement of the *domain-specific self-concept* is geared to the PISA 2000 study that had gathered three subdimensions: overall academic self-concept, verbal self-concept, and mathematical self-concept (see Kunter et al. 2002). This entirely matches the specific structure of the school stages as well as the typical hierarchy in school. Furthermore, every subdimension consists of only three items. Therefore, the instrument perfectly suits the needs of NEPS and is being applied in the school stages. In addition to self-concept, we measure *helplessness*. The notion of helplessness goes back to Abramson et al. (1978) and was adapted in a study by Ditton (2007). In analogy to its use there, we integrated the measure of helplessness separately into NEPS for both German and mathematics, thereby complementing the measurement of domain-specific self-concept.

Of course, neither the PISA instrument nor helplessness as covered by Ditton (2007) would be adequate for the cohort of university students. Here, the measurement follows the idea of Dickhäuser et al. (2002) by using their absolute academic self-concept scale, whereas helplessness is geared to Jerusalem and Schwarzer's (2006) study-specific helplessness.

9.5 Personality

Alongside the dimensions of motivation, personal goals, interests, and self-concept, another element is of major importance: an individual's *personality*. By measuring personality characteristics starting at a very young age and continuing up to adulthood, it should be possible to identify not only developmental risks but also protective factors against just these risks (Weinert et al. 2007). In psychological research, a widespread model with a very long tradition is the five factor model (FFM) of personality that can be recovered in most western cultures (e.g., Asendorpf and van Aken 2003; McCrae and Costa 1985, 1991; Weinert et al. 2007). Many instruments are available for collecting information on personality. The so-called 'Big Five' factors are Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Because most instruments such as the well-known NEO-FFI (Borkenau and Ostendorf 1993) use extensive item batteries with about 50–100 items (see Rammstedt 2007) to access the Big Five, their use for

NEPS is very limited. A well-established very short version is the BFI-10 by Rammstedt and John (2007). It has been developed explicitly for contexts in which there is limited time for questioning, and it provides valuable psychometric characteristics with only two items per dimension. Merely for the agreeableness dimension, Rammstedt and John (2007) recommend adding a third item. Because this factor might be crucial for profound analyses on specific research questions, this item has also been included.

For younger cohorts, no self-reported measure of personality is available. Here parents and educators can provide valuable information about a child's personality. According to recent research, the parents' judgment is a useful and quite stable indicator even for 4-year-old children (see Müller et al. 2016; Weinert et al. 2007).

For younger children, parents' and caregivers' evaluation of the child's *temperament* can lead to a better understanding of personality development and its relation to educational processes, because personality emerges out of early temperament in conjunction with the learning environment (Bayer et al. 2015; Putnam and Rothbart 2006). Therefore, NEPS utilizes a multiactor perspective and thus provides information about the personality from very early ages up to the adult life. In this manner, we are able to monitor the development of personality traits over the complete life course, and, in the long term, collect and link data about personality, competence development, educational success, and occupational prospects.

9.6 Social Skills and Parenting Behavior

Another important domain in educational processes and competence is social behavior. Socially competent behavior is of central importance for denoting risks of negative behavior development (see Beelmann et al. 2006; Weinert et al. 2007). Capturing social skills in general is a challenging task, because many different instruments are available. Extensive scales focusing on as many distinct facets as possible are not suitable within the framework of a panel study. Therefore, a slightly narrowed perspective seemed appropriate. Here, we concentrate on some subdomains of social behavior and thereby focus on behavioral attributes. A popular instrument for measuring such social skills is Goodman's (1997, 1999) Strengths and Difficulties Questionnaire (SDQ). The SDQ "provides balanced coverage of children and young people's behaviours, emotions, and relationships" (Goodman 1997, p. 581), and consists of five dimensions, namely Emotional Symptoms, Conduct Problems, Hyperactivity, Peer Problems, and Prosocial Behavior. A major advantage of the SDQ is the availability of versions for teachers and parents. Thus, we are again able to overcome the problematic lack of self-reported measures for younger children by taking the multiactor perspective. For economic reasons, we applied psychometric and content criteria to select items for NEPS (see Bettge et al. 2002; Hagquist 2007).

Furthermore, in the Kindergarten stage, educators and parents give additional information on aggressive and disruptive behavior. Here we ask them questions taken from the Teacher Assessment of Social Behaviour (TASB; see Cassidy and Asher 1992). Hence, we gain a quite differentiated picture of social behavior from a very young age onward, and it is based on data from the different perspectives taken by multiple informants.

Beginning at the age of 18, another social skill facet is added by measuring negative assertion and conflict management. These two concepts are part of the German version of the Interpersonal Competence Questionnaire (see Riemann and Allgöwer 1993). Both facets were adapted to the challenges of telephone interviewing, so that the NEPS version cannot be compared on the level of items with the original version from Riemann and Allgöwer (see Bayer et al. 2012).

9.7 Measurement Schedule

All six NEPS starting cohorts contain an individual selection of the motivational concepts and personality aspects presented above. Table 9.1 displays the measurement points for all currently available instruments. Because there are some cases in which only subgroups were surveyed, there may occur some deviations within single waves (e.g., students in school vs. apprentices in vocational training). Further information can be found on the NEPS website.

9.8 Conclusion

The aim of this article has been to give an outline of the use and measurement of motivational concepts as well as personality aspects within NEPS. When selecting instruments, we focused particularly on their applicability across the complete life course. As questioning time is a scarce good, the economy of the instrument in terms of item count is also crucial—extensive scales with large item batteries could not be incorporated into our study. Further important decision criteria were, of course, to select concepts that are used in several distinct motivational theories, and ones that are relevant for educational sciences and competence development research. The constructs measured are achievement motivation, personal goals, general interest orientations, topic-related interests, self-concept facets, self-regulation, personality aspects such as the Big Five, and selected social behavior dimensions. The integration of motivational concepts and personality aspects into NEPS allows researchers from different disciplines to analyze both educational processes and competence development on a sophisticated level.

Table 9.1 Overview: measurement of motivational concepts and personality aspects

	SC1—Early childhood	SC2—Kinder-garten	SC3—Grade 5	SC4—Grade 9	SC5—First-year students	SC6—Adults
Motivation						
Intrinsic motivation		W7	W4, W8	W5, W8	W5	
Extrinsic motivation			W4, W8	W5, W8	W5	
Effort			W8	W5		
Personal goals and goal pursuit						
Tenacious goal pursuit and flexible goal adjustment			W7	W3	W4	
Locus of control						W6
Meaning of work			W4	W3, W9	W3	
Optimization strategies			W7	W9		
Interests						
General interest orientations		W6	W2, W6	W2, W7, W8, W9	W1, W9	W4, W7
Topic-related interests			W2, W6	W2	W1	W4
Self-concept						
General self-concept			W1, W5	W1, W7, W8	W3, W10	W6
Domain-specific self-concept			W1, W5	W1, W7, W8	W2, W6	
Helplessness			W3, W6	W2	W2, W6	
Personality						
Big Five self-rating	W5°		W3, W5	W1, W9	W3, W10	W5, W8
Big Five informant rating		W2, W4	W3, W6			
Temperament	W1, W2, W3, W4, W5					
Social skills and parenting behavior						
Parenting styles and goals	W2, W5					
SDQ subscales—self-rating			W2, W6	W2		
SDQ subscales—informant rating	W4	W1, W5	W2, W6	W1		
Disturbing behavior (TASB)		W1, W4				
Self-rating of Interpersonal Competence Questionnaire				W7, W8	W8	W6

W: wave
°self-rating parent

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