The Assessment, Dimensionality, and Development of Narcissism in Early Adulthood

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Abstract

Several researchers have pointed out that narcissism can have detrimental consequences for other people and society (e.g., Bushman & Baumeister, 1998; Twenge & Campbell, 2009). Hence, it is surprising that little research has focused on how narcissism develops and how the environment influences the development of narcissism. The present dissertation investigated the assessment, dimensionality, and development of narcissism in early adulthood.

To pave the way for research on the development of narcissism, Studies 1 and 2 investigated the assessment and dimensionality of narcissism. Study 1 examined the closeness to unidimensionality and measurement precision of the subscales of two narcissism questionnaires, the Narcissistic Admiration and Rivalry Questionnaire (NARQ; Back et al., 2013) and the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979). We assessed the closeness to unidimensionality and measurement precision of the two questionnaires using minimum rank factor analysis and item response theory, respectively, across three large samples from two different countries.

Across the samples of Study 1, the two subscales of the NARQ showed high levels of closeness to unidimensionality and measurement precision. These result are in line with the two-dimensional structure proposed by Back et al. (2013). This structure splits grandiose narcissism into assertive aspects (i.e., narcissistic admiration) and antagonistic aspects (i.e., narcissistic rivalry). Some NPI subscales, which are also believed to assess grandiose narcissism, also showed high levels of closeness to unidimensionality and measurement precision. Because these NPI dimensions were related to but distinct from the two NARQ dimensions, Study 1 indicated that there are more dimensions of grandiose narcissism than the two dimensions proposed by Back et al. (2013).

Study 2 investigated how the various dimensions of narcissism, including dimensions of grandiose and vulnerable narcissism, are related to overclaiming bias. Overclaiming bias is a form of self-enhancement that is characterized by illegitimately claiming knowledge. In a large online sample, we modeled the various narcissism dimensions assessed with the NARQ, the NPI, and the Pathological Narcissism Inventory (Pincus et al., 2009) with a second-order factor model. The model contained three second-order factors: assertive narcissism, antagonistic narcissism, and vulnerable narcissism. The results showed that only assertive narcissism but not

antagonistic or vulnerable narcissism were related to overclaiming bias. The fact that the various dimensions or second-order factors of narcissism were related differently to an external criterion buttresses the idea that there is a need to distinguish various kinds of narcissism.

Study 3 investigated the mean-level development of narcissistic admiration from age 20 to 30. Moreover, Study 3 researched how individual differences in the development of narcissistic admiration are related to studying economics at university and experiencing any of 30 life events (e.g., starting a new job or getting married). We analyzed longitudinal data from two samples from the TOSCA study (Transformation of the Secondary School System and Academic Careers study; Köller, Watermann, Trautwein & Lüdtke, 2004; Trautwein, Neumann, Nagy, Lüdtke, & Maaz, 2010). In both cohorts, the mean levels of narcissistic admiration barely changed. In contrast to our hypothesis, studying economics was not related to an increase in narcissistic admiration over time. That said, five life events (e.g., a negatively evaluated *failing of an important exam* or a positively evaluated *change to another university/apprenticeship*) were positively related to changes in narcissistic admiration during early adulthood.

The results of the three studies are discussed with reference to previous studies and relevant theories. Implications are considered. Strengths and limitations are assessed. And directions for future research are suggested. The main takeaways of the dissertation are: Longitudinal research on narcissism needs to distinguish various dimensions or, at least, second-order factors of narcissism. Furthermore, certain experiences in early adulthood are related to the development of narcissistic admiration.

Zusammenfassung

Eine Reihe von Forschern hat aufgezeigt, dass Narzissmus für andere Menschen und die Gesellschaft abträglich sein kann (z.B., Bushman & Baumeister, 1998; Twenge & Campbell, 2009). Angesichts dessen überrascht es, dass sich bisher kaum Forschung damit beschäftigt hat, wie sich Narzissmus entwickelt und wie Umweltfaktoren die Narzissmus-Entwicklung beeinflussen können. Die vorliegende Dissertation untersucht die Erfassung, Dimensionalität und Entwicklung von Narzissmus im jungen Erwachsenenalter.

Als Vorbereitung für die Forschung zur Narzissmusentwicklung untersuchten Studie 1 und 2 zunächst die Erfassung und Dimensionalität von Narzissmus. Studie 1 überprüfte die Messgenauigkeit und die Nähe zur Eindimensionalität der Subskalen zweier Narzissmusfragebögen, dem Narcissistic Admiration and Rivalry Questionnaire (NARQ; Back et al., 2013) und dem Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979). Die Messgenauigkeit und Nähe zur Eindimensionalität wurden mittels Item Response Theorie bzw. Minimum Rank Faktorenanalyse mit drei großen Stichproben (aus zwei verschiedenen Ländern) untersucht.

Über die Stichproben hinweg zeigten die zwei NARQ-Subskalen ein hohes Niveau an Messgenauigkeit und Nähe zur Eindimensionalität. Diese Resultate entsprechen der zweidimensionalen Struktur, die Back et al. (2013) vorgeschlagen haben. Sie teilt grandiosen Narzissmus in assertive Aspekte (Narzisstische Bewunderung) und antagonistische Aspekte (Narzisstische Rivalität). Manche der NPI-Subskalen, die auch grandiosen Narzissmus messen, wiesen ebenfalls ein hohes Niveau an Messgenauigkeit und Nähe zur Eindimensionalität auf. Diese NPI-Dimensionen korrelierten zwar mit den NARQ-Dimensionen, waren aber trotzdem verschieden von diesen. Daher verdeutlichte Studie 1, dass grandioser Narzissmus aus mehr Dimensionen besteht als den zwei von Back et al. (2013) vorgeschlagenen.

Studie 2 untersuchte, wie die verschiedenen Dimensionen von Narzissmus, einschließlich grandioser und vulnerabler Dimensionen, mit Overclaiming Bias zusammenhängen. Overclaiming Bias ist eine Form von Selbstüberschätzung, die durch das ungerechtfertigte Behaupten von Wissen gekennzeichnet ist. In einer großen Online-Umfrage wurden die verschiedenen Dimensionen von Narzissmus mittels NARQ, NPI und Pathological Narcissism Inventory (Pincus et al., 2009) erfasst und mittels Second-Order Faktormodell modelliert. Das

Modell beinhaltete drei Faktoren zweiter Ordnung: assertiver Narzissmus, antagonistischer Narzissmus und vulnerabler Narzissmus. Die Resultate zeigten, dass nur assertiver Narzissmus, nicht aber antagonistischer und vulnerabler Narzissmus mit Overclaiming Bias zusammenhängt. Dass die verschiedenen Dimensionen bzw. Faktoren zweiter Ordnung von Narzissmus unterschiedlich mit einem externen Kriterium zusammenhingen, untermauert die Notwendigkeit, mehrere Arten von Narzissmus zu unterscheiden.

Studie 3 untersuchte die Mittelwertentwicklung von Narzisstischer Bewunderung (Narcissistic Admiration) im Alter zwischen 20 und 30. Zusätzlich beschäftigte sich Studie 3 mit der Frage, inwiefern individuelle Unterschiede in der Entwicklung von Narzisstischer Bewunderung mit dem Studieren wirtschaftlicher Studienfächer und dem Erleben eines von 30 Lebensereignissen (z.B. Beginn eines neuen Jobs oder Hochzeit) zusammenhängen. Wir analysierten längsschnittliche Daten von zwei Stichproben der TOSCA-Studie (Transformation des Sekundarschulsystems und akademische Karrieren Studie; Köller, Watermann, Trautwein & Lüdtke, 2004; Trautwein, Neumann, Nagy, Lüdtke, & Maaz, 2010). In beiden Kohorten veränderten sich die Mittelwerte von Narzisstischer Bewunderung kaum. Im Widerspruch zu unserer Hypothese hing das Studieren wirtschaftlicher Fächer nicht mit der Entwicklung von Narzisstischer Bewunderung zusammen. Allerdings hingen fünf Lebensereignisse (z.B. ein negativ bewertetes *Scheitern bei einer wichtigen Prüfung* und der positive bewertete *Wechsel zu einer anderen Universität/Lehre*) positiv mit der Veränderung in Narzisstischer Bewunderung zusammen.

Die Resultate der drei Studien mit Bezug auf bisherige Studien und relevante Theorien diskutiert. Implikationen werden erläutert, Stärken und Schwächen beurteilt, und Richtungen für weitere Forschung aufgezeigt. Die wichtigsten Schlussfolgerungen der Dissertation sind: Längsschnittliche Narzissmus-Forschung sollte die verschiedenen Narzissmus-Dimensionen oder zumindest Faktoren zweiter Ordnung von Narzissmus unterscheiden. Außerdem hängen bestimmte Erfahrungen im frühen Erwachsenenalter mit der Entwicklung von Narzisstischer Bewunderung zusammen.

Contents

1. INTRODUCTION AND THEORETICAL FRAMEWORK 2

1.1 THE PERSONALITY TRAIT NARCISSISM AND ITS ORIGINS IN PSYCHOANALYSIS 6

1.1.1 Freud's Conceptualizations of Narcissism 6

1.1.2 Kohut's Forms and Transformations of Narcissism 7

1.1.3 Kernberg's Conceptualization of Narcissism 9

1.1.4 Narcissism in the Field of Personality Psychology 10

1.2 THE ASSESSMENT AND DIMENSIONALITY OF NARCISSISM 11

1.2.1 Narcissism is not Unidimensional 12

1.2.2 Grandiose and Vulnerable Narcissism 13

1.2.3 Breaking up Grandiose Narcissism into Narcissistic Admiration and Rivalry 15

1.3 THE CONSEQUENCES OF NARCISSISM IN THE EDUCATIONAL SPHERE 17

1.3.1 Narcissism, intellectual self-enhancement, and academic self-concept 18

1.3.2 Narcissism and academic motivation 20

1.3.3 Narcissism and academic performance 21

1.3.4 Narcissism and Social Behavior in the Classroom and Other Educational Settings 22

1.4 THE DEVELOPMENT OF NARCISSISM IN EARLY ADULTHOOD 24

1.4.1 The Development of the Big Five Personality Traits 24

1.4.2 Mean-Level Development of Narcissism in Early Adulthood 26

1.4.3 Narcissism Development, the Studying of Economics, and Life Events 29

1.5 RESEARCH QUESTIONS AND OUTLINE OF STUDIES 33

1.6 REFERENCES 36

2. STUDY 1: A COMPARISON OF UNIDIMENSIONALITY AND MEASUREMENT PRECISION OF THE NARCISSISTIC PERSONALITY INVENTORY AND THE NARCISSISTIC ADMIRATION AND RIVALRY QUESTIONNAIRE 54

3. STUDY 2: A DIMENSION- AND CONTENT-SPECIFIC APPROACH TO INVESTIGATE THE NARCISSISM-OVERCLAIMING 110

4. STUDY 3: THE DEVELOPMENT OF NARCISSISM AND MACHIAVELLIANISM IN EARLY ADULTHOOD 136

5. GENERAL DISCUSSION 196

5.1 SUMMARY OF RESULTS 198

5.2 THEORETICAL IMPLICATIONS 199

5.2.1 The Assessment and Dimensionality of Narcissism 199

5.2.2 The Development of Narcissism *202*
5.3 IMPLICATIONS FOR EDUCATIONAL RESEARCH 206
5.4 IMPLICATIONS FOR EDUCATIONAL PRACTICE 209
5.5 STRENGTHS AND LIMITATIONS 210
5.6 DIRECTIONS FOR FUTURE RESEARCH 213
5.6.1 The Dimensionality of Narcissism *213*
5.6.2 The Development of Narcissism *215*
5.6.3 Narcissism and Educational Research *217*
5.7 CONCLUSION 219
5.8 REFERENCES 220

1

Introduction and Theoretical Framework

1. Introduction and Theoretical Framework

In many industrialized countries, the priorities of the educational system are to improve useful skills and knowledge, whereas shaping students' personality is not a priority. This is evident, for example, in the focus on reading, mathematics, science, and problem solving of most large-scale educational studies such as the Programme for International Student Assessment (PISA; OECD, 2013). Thus, this raises the question: Should the education system not also, as much as possible, attempt to shape the personality traits of people and teach them to be good citizens? Of course, you might immediately object by asking: What are good citizens? For example, is it better to have citizens with personalities characterized by obedience and compliance or personalities characterized by the tendency to disagree and think critically? The answer probably depends. But even if there are no easy answers to the questions of what constitutes good citizens and with what aim education should affect the personality traits of people, shall we therefore simply ignore the possibility that the educational system already plays a role in shaping people's personality traits? The educational system probably shapes people's personalities, and it does so regardless of what is intended or understood. Hence, we may as well gather information and study how the educational system and the environment in general are related to the development of personality traits. We may as well investigate how and why the educational system and specific aspects of the environment influence people's characters and discuss later how the educational system *should* influence people's characters and what we as a society want our citizens' personalities to be like.

The current dissertation aims to shed light on these large questions by investigating how studying economics at university and 30 life events shape the development of the personality trait narcissism[1] in early adulthood. I decided to focus on the personality trait narcissism because, compared with other personality traits, its development has rarely been studied—which is surprising given that the consequences of narcissism for other people and society as a whole have often been bemoaned (e.g., Bushman & Baumeister, 1998; Campbell & Buffardi, 2008;

[1] Narcissism is conceptualized in this dissertation as a non-clinical personality trait that is dimensional and not categorical: People are believed to vary in narcissism along a continuum rather than some people ("narcissists") are qualitatively distinct from others ("non-narcissists").

Twenge & Campbell, 2009). Furthermore, I focus on early adulthood because previous studies have found that personality traits related to narcissism (e.g., social dominance) show strong and robust changes during early adulthood (e.g., Roberts, Walton, & Viechtbauer, 2006).

This dissertation also addresses a second question that is in many ways a prerequisite for the investigation of the development of narcissism: How can we capture the individual differences in narcissism we perceive in everyday life, clinical contexts, and behavioral studies with a method that is able to withstand scientific scrutiny? In short, how should we assess narcissism? The question about the assessment of personality traits is as old as personality research itself. And it is an intermediate step in the process of investigating the development of narcissism. Study 1 of this dissertation thus compared two psychometric properties (i.e., closeness to unidimensionality and measurement precision) of two prominent self-report questionnaires that are commonly used to assess narcissism, the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979) and the Narcissistic Admiration and Rivalry Questionnaire (NARQ; Back et al., 2013). Study 2 further clarified the assessment of narcissism by investigating the dimensionality of narcissism: how many dimensions there are, how the dimensions can be modeled, and how differently the different dimensions of narcissism are related to overclaiming bias (i.e., a form of self-enhancement that is characterized by an illegitimate claim of knowledge).

Finally, Study 3 focused on the development of narcissism in early adulthood and how studying economics at university and 30 life events are related to the development of narcissism.

1.1 The Personality Trait Narcissism and Its Origins in Psychoanalysis

People are not all the same. They vary with regard to physical attributes as well as with regard to psychological characteristics. Some people are very expressive and talk a lot, whereas others prefer to keep their feelings and thoughts to themselves. Some people think they are good at mathematics, whereas others think mathematics is not their cup of tea. Some people react aggressively when provoked, whereas others are more composed in their reactions to provocations. Some people excel on intelligence tests; others perform poorly. These and similar individual differences in psychological qualities fall under the umbrella term "personality traits." More abstractly defined, personality traits are relatively stable individual differences in the tendency to experience certain emotions, cognitions, behaviors, and motivations. This is a very broad definition of personality traits as it includes interests, values and motives, attitudes, self-related concepts, various forms of abilities (e.g., cognitive or emotional), and broad factors of personality such as extraversion or conscientiousness (e.g., Asendorpf, 2007). It is important to note that personality traits are traits and not states: They are tendencies that are relatively stable across situations and over time.

The personality trait *narcissism* has its origins in psychoanalytic theories. Sigmund Freud and other psychoanalytical thinkers derived the term "narcissism" from the Greek myth about narcissus who fell in love with his own reflection in a pond. In line with the myth, psychoanalysts have often defined narcissism as the condition of self-love at the expense of love for other people, which is also called "lack of object love" (e.g., Freud, 1914/2007; Kohut, 1966; Reich, 1960). That said, Freud used the term "narcissism" inconsistently throughout his writings, and it has been used inconsistently throughout the psychoanalytical literature in general.

1.1.1 Freud's Conceptualizations of Narcissism

Three of Freud's conceptualizations of narcissism have been especially influential on psychoanalysts and personality psychologists. First, Freud (1914/2007) conceptualized *primary narcissism* as an early-life self-love phase that everybody undergoes. Second, he conceptualized *secondary narcissism* as a defense mechanism by which one withdraws one's libido from other

people onto the self (Freud, 1914/2007). Secondary narcissism was believed to be the consequence of disappointments related to unrequited love and narcissistic mortifications ("narzisstische Kränkungen"). Third, he conceptualized a *narcissistic libidinal type*. In Freud's (1931/1955) text Libidinal Types, he sketched out three libidinal types: an erotic, a narcissistic, and a compulsive type. The following description of the narcissistic type has been frequently cited by personality psychologists as a foundational description of narcissism (e.g., Krizan & Herlach, 2017; Miller & Campbell, 2008):

> The subject's main interest is directed to self-preservation; he is independent and not open to intimidation. His ego has a large amount of aggressiveness at its disposal, which also manifests itself in readiness for activity. In his erotic life loving is preferred above being loved. People belonging to this type impress others as being "personalities"; they are especially suited to act as a support for others, to take on the role of leaders and to give a fresh stimulus to cultural development or to damage the established state of affairs. (Freud 1931/1955, p. 3)

Taken together, Freud's influential conceptualizations of narcissism include (a) a normal infantile developmental phase, (b) a defense mechanism that leads to an increased self-focus, and (c) a personality characterized by a high degree of independence and dominance.

Various psychoanalysts after Freud have also proposed diverse narcissism concepts. Going into detail about all of the narcissism concepts proposed by the psychoanalysts and psychoanalytical schools that followed Freud would go beyond the scope of this dissertation (for a collection of important conceptualizations of narcissism, see Morrison, 1986). Here, my aim is to summarize the narcissism concepts of two influential psychoanalysts besides Freud: Heinz Kohut and Otto F. Kernberg. Both are often referenced by personality psychologists and have influenced the notions of narcissism that exists in the field of personality psychology today.

1.1.2 Kohut's Forms and Transformations of Narcissism

Building on Freud's concepts of narcissism, Heinz Kohut (1966) distinguished two major forms of narcissism: the *ego ideal* and the *narcissistic self* (later called "grandiose self"; Kohut, 1971). In an attempt to maintain the original perfection and omnipotence of the primary phase of narcissism, the child creates an idealized parental imago, which later becomes the *ego ideal*. The perfection and power of primary narcissism is initially projected onto the parent figure (i.e., idealized parental imago). After frustrating but inevitable object losses (e.g., death of parent,

absence of parent, withdrawal of affection due to physical or mental illness), the projection of perfection and power onto the idealized parental imago is brought back to the self by identifying with the parent (i.e., formation of the ego ideal). The ego ideal corresponds to the introjected qualities of the idealized parent: "Every shortcoming of the idealized parent leads to a corresponding internal preservation of the externally lost quality of the object [i.e., parent or other caregiver]" (Kohut, 1966, p. 65-66). The internalized values, standards, and ideals gain such an emotional importance (i.e., they arouse love and admiration) because the narcissism has passed through a cherished object before its reinternalization. When the person does not live up to this ego ideal, narcissistic tensions arise.

The second form of narcissism, the *narcissistic self*, is a normal developmental achievement in infancy characterized by exhibitionistic drives and grandiose fantasies. These exhibitionistic drives must gradually become desexualized and subordinated to goal-directed activities and ambitions. This is achieved best through gradual frustrations combined with loving support (Kohut, 1966). Overt and covert attitudes of rejection and overindulgence by the caregiver (especially alterations between lack of support and overindulgence) can lead to disturbances according to Kohut (1966): "Instead of pleasurable confirmation of the value, beauty, and lovableness of the self, there is painful shame" (p. 70). These premature interferences with the narcissistic self might lead to long-lasting narcissistic vulnerabilities because grandiose fantasies are repressed and inaccessible to modifying influences.

> If the grandiosity of the narcissistic self … has been insufficiently modified because traumatic onslaughts on the child's self-esteem have driven the grandiose fantasies into repression, then the adult ego will tend to vacillate between an irrational overestimation of the self and feelings of inferiority and will react with narcissistic mortification to the thwarting of its ambitions. (Kohut, 1966, p. 68-69)

More than many other psychoanalysts, Kohut (1966, 1971) pointed out that narcissism, if sublimated, can have positive consequences. The goal of therapy should not necessarily be to change narcissism into a love of others but the integration, strengthening, and reshaping of narcissistic structures. It is possible to harness narcissistic energies and drives by transforming narcissism into creativity, humor, empathy, and wisdom.

1.1.3 Kernberg's Conceptualization of Narcissism

Compared with Kohut, Kernberg placed more emphasis on the pathological nature of narcissism. Whereas Kohut viewed the narcissistic self as a fixation on a *normal* primitive self (i.e., an infantile normal form of narcissism), Kernberg viewed the narcissistic self (which he also called the "pathological grandiose self") as part of a *pathological* structure, clearly different from infantile narcissism (Kernberg, 1974). For Kernberg (1970, 1974), the narcissistic self is a compensation for ego weakening effects of a primitive defense organization that is common to narcissism and borderline personality disorder. According to Kernberg, both narcissism and borderline personality are characterized by primitive defense mechanisms: splitting, denial, projective identification, omnipotence, and primitive idealization. The difference is that narcissistic patients show better impulse control and (on the surface) better social and occupational functioning than borderline patients. In fact, narcissistic personalities are often intensively ambitious and strive for brilliance, wealth, power, and beauty to get the external admiration and gratification they long for. However, careful observation of their work reveals superficiality and flightiness (Kernberg, 1970). Taken together, Kernberg saw more similarities between narcissism and borderline conditions than Kohut did.

Another difference between Kohut and Kernberg was that Kernberg more strongly emphasized the presence of envy than Kohut did. According to Kernberg (1970, 1974), narcissistic patients are occupied by chronic and intense feelings of envy and defenses against such envy (i.e., devaluation of others, omnipotent control, and narcissistic withdrawal).

That said, Kernberg (1970, 1974) stated that he agreed with Kohut on several descriptive features of narcissism: People with a narcissistic personality present an unusually large degree of self-absorption and self-reference in their interactions with other people. Although they lack interest in and empathy for others and although they have inflated self-views, they have a great need to be loved and admired by others. Their lack of empathy and their need for admiration go hand in hand with exploitative, manipulative, and controlling tendencies and a lack of trust, coldness, and ruthlessness. When they are disappointed or abandoned, they do not react with real sadness for the loss but with anger, resentment, and revengeful wishes. Some narcissistic patients report strong conscious feelings of insecurity and inferiority. Feelings of insecurity and inferiority may also alternate with feelings of greatness (Kernberg, 1970).

1.1.4 Narcissism in the Field of Personality Psychology

In the last four decades, the various psychoanalytical and clinical conceptualizations of narcissism have made their way into the field of personality psychology. Psychoanalytical and clinical conceptualizations have influenced personality psychologists and their scale construction either directly (e.g., Hendin & Cheek, 1997; Murray, 1938) or indirectly (i.e., they influenced the description of narcissistic personality disorder in the Diagnostic and Statistical Manual of Mental Disorders, which in turn influenced personality psychologists; e.g., Raskin & Hall, 1979; Raskin & Terry, 1988). All the same, narcissism has received more and more attention in the field of personality psychology in the last 30 years and can now be considered one of the most prominent personality traits along with the Big Five personality traits (i.e., extraversion, agreeableness, openness to experience, emotional stability, and conscientiousness).

Narcissism has been defined in the field of personality psychology (and is defined in the current dissertation) as a nonclinical personality trait that describes individual differences in the tendency to desire agentic or ego goals (superiority, uniqueness, grandiosity, fame, status) above communal or non-ego goals (affiliation, tolerance, communal feelings; e.g., Campbell & Foster, 2007; Crocker & Park, 2004; Miller & Campbell, 2008; Morf, Weir, & Davidov, 2000; Wink, 1991).[2] That said, as in the field of psychoanalysis, how exactly narcissism is defined depends on which personality psychologist you ask, as I will show in Chapter 1.2.

Naturally, because the Big Five were constructed to cover the whole range of personality traits, the Big Five and narcissism show signs of redundancy (e.g., O'Boyle, Forsyth, Banks, Story, & White, 2014). Narcissism is uniquely characterized by an exceptionally strong drive for superiority, uniqueness, grandiosity, fame, status, and high self-esteem. Accordingly, the usual correlations between narcissism scales and any Big Five scales reach their maximum at around .40 to .50 (O'Boyle et al., 2014), which means that 16% to 25% of the variance in narcissism is shared with variance in extraversion, for example.

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[2] For example, Miller and Campbell (2008) stated: "Both academicians and clinicians think of the prototypical narcissist as being highly dominant, agentic, and antagonistic" (p. 470-471). On the other hand, findings by Besser and Priel (2010) suggest that only people high in grandiose narcissism but not people high in vulnerable narcissism care more about achievements than about interpersonal relationships.

1.2 The Assessment and Dimensionality of Narcissism

A fundamental question in personality research is how a respective personality trait is to be assessed. Both narcissism and the Big Five personality traits are assessed via self-report questionnaires. However, narcissism and the Big Five have different origins, and this has important implications for their assessment as I will illustrate in the following by comparing how narcissism questionnaires and the Big Five questionnaires were developed.

The Big Five personality traits were retrieved via a lexical approach (for a review, see e.g., John & Srivastava, 2000). Researchers inspected dictionaries to derive a large number of adjectives that describe psychological traits and characteristics of people. Participants rated how much each adjective applied to themselves or to a peer. These ratings were analyzed via factor analysis. The results revealed that five factors could explain a large number of the associations found among the adjective ratings.

An advantage of the lexical approach is that it has led to a five-factor structure that is widely accepted in the field of personality psychology—although there is some debate about whether there are five or six underlying factors (see e.g., Lee & Ashton, 2004). Accordingly, there are a number of established and well-validated Big Five questionnaires that all measure more or less the same five dimensions. Examples of such questionnaires are the Big Five Inventory (John & Srivastava, 1999) or the Revised NEO Personality Inventory (Costa & MacCrae, 1992).

The lexical approach also has some disadvantages. The lexical approach is not based on a theory, and it does not provide a theory (e.g., John & Srivastava, 1999). Furthermore, the lexical approach depends on concepts and words used by lay people, and these tend to show various (language) biases (e.g., Trofimova, 2014).

Narcissism has been able to avoid some of these limitations. Narcissism has a stronger theoretical foundation, and its assessment depends less on concepts and words used by lay people because it was not retrieved via a lexical approach. Instead, psychoanalytical theories suggested the concept of narcissism (Chapter 1.1). The frequent reference to narcissism by clinical psychologists led to the introduction of narcissistic personality disorder into the Diagnostic and Statistical Manual of Mental Disorders-III (DSM-III). On the basis of the behavioral criteria for the narcissistic personality disorder outlined in the DSM-III, Raskin and

Hall (1979) developed the most used self-report questionnaire on narcissism, the Narcissistic Personality Inventory (NPI; see also Raskin & Terry, 1988).

However, the reliance on diverse psychoanalytical theories (Chapter 1.1) and the DSM-III rather than on the lexical approach has also produced some issues. Most striking, no consensus has been reached on the dimensionality of narcissism. This lack of consensus on dimensionality has manifested itself in the ongoing debate on the factor structure of the NPI and in the great number and variety of narcissism questionnaires that have been developed before and after the introduction of the NPI in 1979.

1.2.1 Narcissism is not Unidimensional

In the past, narcissism has often been viewed as a unidimensional construct. Accordingly, several developers have tried to develop narcissism scales that are unidimensional (e.g., Raskin & Terry, 1988). However, these views and attempts have not been able to withstand empirical testing.

A first indication of its multidimensionality was that narcissism was found to be correlated with a heterogeneous set of outcomes. Researchers have shown that narcissism is related to psychological health (Sedikides, Rudich, Gregg, Kumashiro, & Rusbult, 2004) and positive self-views (Campbell, Rudich, & Sedikides, 2002). At the same time, narcissism has been found to be related to aggressive behavior (Golmaryami & Barry, 2009), fragile self-views (Thomaes et al., 2010), emotional volatility (Besser & Zeigler-Hill, 2010), and dysfunctional relationships (Back et al., 2013).

A second indication of the multidimensionality was that plenty of research has suggested that the NPI is multidimensional (e.g., Ackerman et al., 2011; Brown, Budzek, & Tamborski, 2009; Exline, Baumeister, Bushman, Campbell, & Finkel, 2004; Zeigler-Hill & Besser, 2013): Factor analyses of the NPI items have repeatedly revealed more than one factor. Thus, several authors have proposed a multifactorial model of the NPI (e.g., Ackerman et al., 2011; Brown, 2009; Emmons, 1987; Kubarych, Deary, & Austin, 2004).

The third indication was that different NPI factors have shown different correlations with external criteria (e.g., Ackerman et al., 2011; Brown et al., 2009; Exline et al., 2004; Zeigler-Hill & Besser, 2013). For example, the Entitlement/Exploitativeness facet of the NPI was not correlated with self-esteem, whereas other NPI facets were positively correlated with self-esteem

(Ackerman et al., 2011). Similarly, some narcissism researchers have found that different narcissism scales are related differently to life outcomes. For example, Cramer and Jones (2008) found that one type of narcissism ("autonomy") measured at age 33 was positively related to well-being during subsequent years, whereas two other types of narcissism ("willfulness" and "hypersensitivity"; Wink, 1992) measured at age 33 were either negatively or not associated with subsequent well-being.

As a consequence of all these findings, it has now been widely accepted in the field of personality psychology that narcissism is not a unidimensionality construct (e.g., Ackerman et al., 2011; Back et al., 2013; Miller et al., 2011; but see also studies on narcissism in childhood, e.g., Brummelman et al., 2015).

1.2.2 Grandiose and Vulnerable Narcissism

The most common way in which researchers have abandoned unidimensionality has been to distinguish grandiose narcissism from vulnerable narcissism. A forerunner of this trend was Paul M. Wink. Already in 1991, he extracted two orthogonal components in a principal component analysis of data from six narcissism scales (Wink, 1991). He named the two components *Grandiosity-Exhibitionism* and *Vulnerability-Sensitivity*. Grandiosity-Exhibitionism but not Vulnerability-Sensitivity was positively related to dominance, sociability, self-acceptance, and aggression. Vulnerability-Sensitivity but not Grandiosity-Exhibitionism was positively related to defensiveness, anxiety, and vulnerability. Both dimensions were positively related to conceit, self-indulgence, and disregard of others.

A few years afterwards, Hendin and Cheek (1997) with reference to an old psychoanalytically inspired scale, the Murray Narcissism Scale (1938), introduced the Hypersensitivity Narcissism Scale. The Hypersensitivity Narcissism Scale was developed as a counterpart to the NPI, which is dominated by the grandiose and exhibitionistic aspects of narcissism. Thus, Hendin and Cheek (1997) made sure the Hypersensitivity Narcissism Scale was uncorrelated with the total score of the NPI. Although the Hypersensitivity Narcissism Scale received little attention in the years after its introduction (Cheek, Hendin, & Wink, 2013), the hypersensitivity scale gained traction as a measure of vulnerable narcissism after Dickinson and Pincus (2003) and Cain, Pincus, and Ansellm (2008) advocated the distinction between grandiose and vulnerable narcissism.

Dickinson and Pincus (2003) advocated for the distinction because they observed that some people high in narcissism were less sensitive to interpersonal conflict (i.e., people high in grandiose narcissism) than other people high in narcissism (i.e., people high in vulnerable narcissism). Whereas people high in grandiose narcissism are outgoing and immune to the feedback and opinions of others and feast on their grandiose self-views, people high in vulnerable narcissism are shy, obsessed with the approval of others, and suffer from feelings of inadequacy, shame, and envy (see also Hendin & Cheek, 1997; Raskin, Novacek, & Hogan, 1991; Pincus, Cain, & Wright, 2014; Zeigler-Hill, Clark, & Pickard, 2008). Accordingly, grandiose narcissism shows similarities to Freud's (1931/1955) characterization of narcissism as a personality that is described by a high degree of independence and dominance (Chapter 1.1.1), whereas vulnerable narcissism shows similarities to Kernberg's (1970, 1974) depiction of narcissism as a personality disorder that resembles borderline personality disorder (Chapter 1.1.3; Miller & Campbell, 2008).

On the basis of these and similar observations, Pincus et al. (2009) introduced the Pathological Narcissism Inventory,[3] which placed more emphasis on vulnerable aspects of narcissism (see also Krizan & Herlache, 2017). Wright, Lukowitsky, Pincus, and Conroy (2010) fit a bifactor model to the Pathological Narcissism Inventory items and extracted two higher order factors: narcissistic grandiosity and narcissistic vulnerability. Even though these two higher order factors were (too) highly correlated (r = .81), the distinction between grandiose and vulnerable narcissism was further promoted by their study and questionnaire.

[3] Pincus et al. (2009) and Pincus and Lukowitsky (2010) proposed that normal or adaptive narcissim should be distinguished from pathological or maladaptive narcissism: According to this view, normal/adaptive narcissism is researched in the field of social and personality psychology and measured by the NPI. Pathological/maladaptive narcissism is studied in the field of clinical psychology and measured by the Pathological Narcissism Inventory. Pincus and Lukowitsky (2010) stated: "the NPI does not assess subclinical [pathological] narcissism reflecting a continuum of functioning, but rather predominantly assesses nondistressed adaptive expressions of the construct [i.e., normal narcissism]" (p. 85). This distinction might initially appear appealing, yet it brings about some ambiguities: Both the NPI and the Pathological Narcissism Inventory are mainly used in nonclinical populations. The NPI has often been described as measuring adaptive as well as maladaptive aspects of narcissism (e.g., Ackerman et al., 2011). Which outcomes are adaptive or maladaptive is debatable: Externalization problems associated with the NPI can be considered to be as maladaptive as the internalization problems associated with the Pathological Narcissism Inventory. Finally, how maladaptive a behavior is depends on the context. For example, the self-promotional behavior of people high in normal/adaptive narcissism might be seen as adaptive in job interviews as it increases the likelihood of getting a job (Paulhus, Westlake, Calvez, & Harms, 2013) but maladaptive in social situations with peers as it decreases the likability of the self-promoter (Scopelliti, Loewenstein, & Vosgerau, 2015).

Finally, Miller et al. (2011) extracted two factors (i.e., grandiose and vulnerable narcissism) in an exploratory factor analysis of the Hypersensitivity Narcissism Scale and the subscales of the NPI and the Pathological Narcissism Inventory. The two factors were weakly correlated (r = .23), and the nomological networks of the two factors were not very similar. These findings have further supported the distinction between grandiose and vulnerable narcissism.

That said, the concept of vulnerable narcissism has struggled to take hold, especially in the field of social/personality psychology. First, the field of social/personality psychology has traditionally focused on grandiose rather than on vulnerable narcissism (e.g., Ackerman, Hands, Donnellan, Hopwood, & Witt, 2016; Miller & Campbell, 2008) presumably because the social consequences of vulnerable narcissism are less observable in social/personality studies than the social consequences of grandiose narcissism. This lack of distinct observable behavior is the reason why vulnerable narcissism is sometimes called *covert narcissism* (e.g., Hendin & Cheek, 1997). Furthermore, some social/personality psychologists are hesitant to adopt the concept of vulnerable narcissism because it (sometimes) overlaps considerably with emotional stability (Miller et al., 2017; but see also Hendin & Cheek, 1997).

1.2.3 Breaking up Grandiose Narcissism into Narcissistic Admiration and Rivalry

The newest trend is to split up grandiose narcissism into two dimensions, which frequently leads to a three-dimensional construct of narcissism (i.e., two dimensions of grandiose narcissism and one dimension of vulnerable narcissism). This trend began with Back et al. (2013) who proposed the Narcissistic Admiration and Rivalry Concept and Questionnaire (NARC and NARQ). The NARC and NARQ break up grandiose narcissism into *narcissistic admiration* and *narcissistic rivalry*. Narcissistic admiration is characterized by assertive, charming, and self-promoting tendencies, whereas narcissistic rivalry refers to antagonistic, aggressive, and other-derogating tendencies.

The breaking up of grandiose narcissism into narcissistic admiration and narcissistic rivalry came about in research on grandiose narcissism and other-rated popularity. Küfner, Nestler, and Back (2013) found that people high in grandiose narcissism (as measured by the NPI total score) displayed more assertive behavior, which was positively related to popularity

(after a group discussion). At the same time, people high in grandiose narcissism also displayed more antagonistic and hostile behavior, which was negatively related to popularity. Because the two pathways canceled each other out, grandiose narcissism was unrelated to other-rated popularity in their study. With the Narcissistic Admiration and Rivalry Concept and Questionnaire (NARC and NARQ), Back et al. (2013) attempted to distinguish these two aspects and pathways of grandiose narcissism.

When confronted with the NARC and NARQ, however, researchers were hesitant to abandon the two-dimensional view on narcissism (i.e., grandiose and vulnerable narcissism) and adopt a three-dimensional structure (i.e., narcissistic admiration, narcissistic rivalry, and vulnerable narcissism). Narcissistic rivalry was initially seen by some narcissism researchers as another manifestation of the vulnerable dimension of narcissism (e.g., Miller et al., 2014). However, more recent studies have recognized that there is a third dimension at play (Krizan & Herlache, 2017; Miller et al., 2016). For example, Miller et al. (2016) extracted three factors in a factor analysis on the 15 subscales of a very comprehensive narcissism questionnaire (i.e., the Five-Factor Narcissism Inventory; Glover, Miller, Lynam, Crego, & Widiger, 2012). The three narcissism factors that Miller et al. (2016) extracted were named *Antagonism*, which corresponds roughly to narcissistic rivalry; *Neuroticism*, which corresponds roughly to vulnerable narcissism; and *Agentic Extraversion*, which corresponds roughly to narcissistic admiration.

Taken together, there has been much debate about the dimensionality of narcissism since its introduction into the field of personality psychology. At first, it was thought to be a unidimensional construct. Yet, recently it has become clear that it is at least a two-dimensional construct and most probably a three-dimensional construct.

1.3 The Consequences of Narcissism in the Educational Sphere

Before I focus in Chapter 1.4 on how narcissism develops and how educational events and contexts might be related to its development, I will review the literature that has suggested how narcissism is related to educational processes and outcomes. Although an increasing body of research has emphasized the relevance of the Big Five personality traits for educational processes and outcomes (e.g., Damian, Su, Shanahan, Trautwein, & Roberts, 2015; Komarraju, Karau, Schmeck, 2009; Poropat, 2009; Spengler, Lüdtke, Martin, & Brunner, 2013), narcissism has rarely been studied in educational research, as Jonkmann, Becker, Marsh, Lüdtke, and Trautwein (2012) pointed out. Thus, we do not know much about the consequences of narcissism in the educational sphere. Nevertheless, here, I will review all the relevant literature to draw inferences on how narcissism should be related to four educationally relevant domains of behavior: (a) intellectual self-enhancement and academic self-concept, (b) academic motivation, (c) academic performance, and (d) social behavior in the classroom and other educational settings.

Most of the past research on narcissism did not distinguish various dimensions of narcissism. Mostly, the NPI total score has been used as an indicator of narcissism. Because the NPI items measure narcissistic admiration rather than narcissistic rivalry and vulnerable narcissism (Back et al., 2013; see also Miller et al., 2016), most of the findings I will review apply more to narcissistic admiration than to narcissistic rivalry and vulnerable narcissism. Where possible, I will nevertheless try to distinguish these three dimensions of narcissism because these three dimensions of narcissism should show divergent relationships with core educational variables. For example, whereas narcissistic admiration has not been found to be related to academic performance (Jonkmann et al., 2012; see also Westerman, Bergman, Bergman, & Daly, 2011), narcissistic rivalry and vulnerable narcissism should be negatively related to academic performance—I will explain why below. As another example, in social groups in educational settings (e.g., project teams), narcissistic admiration should be associated with striving for social influence through self-promotion and assertiveness, whereas narcissistic rivalry should be associated with striving for social influence through other-derogation and intimidation.

1.3.1 Narcissism, intellectual self-enhancement, and academic self-concept

Narcissism, especially narcissistic admiration, should be positively related to intellectual self-enhancement. Intellectual self-enhancement is the tendency to evaluate one's own knowledge/ability in an unrealistically positive fashion. Unrealistically positive self-views are a central aspect of grandiose narcissism as measured by the NPI (e.g., Campbell & Foster, 2007). In fact, the NPI has sometimes even been called a measure of trait self-enhancement (Paulhus, Harms, Bruce, & Lysy, 2003). Thus, it is not surprising that the NPI total score has often been found to be associated with intellectual self-enhancement (Ames & Kammrath, 2004; Farwell & Wohlwend-Lloyd, 1998; Gabriel, Critelli, & Ee, 1994; Gebauer, Sedikides, Verplanken, & Maio, 2012; John & Robins, 1994; Paulhus & Williams, 2002; Paulhus, et al., 2003; Robins & Beer, 2001). For example, the NPI has been found to be positively correlated with overclaiming bias, that is, illegitimate claims of familiarity with (non)existent general knowledge items (persons, concepts, places, etc.; e.g., Paulhus & Williams, 2002; Paulhus et al., 2003).

Indeed, self-enhancement is a case in point for illustrating how narcissistic people prioritize agentic or ego goals (superiority, uniqueness, grandiosity, fame, status) above communal or non-ego goals (affiliation, tolerance, communal feelings). Others perceive that self-enhancers, compared with non-self-enhancers, are more competent/intelligent (Paulhus, Westlake, Calvez, & Harms, 2013) and assign a higher status to them in groups (Anderson, Brion, Moore, & Kennedy, 2012). On the other hand, self-enhancement runs counter to communal or non-ego goals (affiliation, tolerance, communal feelings) and self-acceptance/growth motives because self-enhancers ignore performance feedback (Jordan & Audia, 2012) and are perceived as cold and arrogant by others after several interactions (Paulhus, 1998). Some studies have even shown that intellectual self-enhancement is negatively related to academic performance (Chiu & Klassen, 2010; Dunlosky & Rawson, 2012; Paulhus & Dubois, 2014). However, this link has been contested (e.g., Gramzow, Johnson, & Willard, 2014; Willard & Gramzow, 2009).

Even though intellectual self-enhancement might have a negative influence on academic performance, the positive self-views of people high in (grandiose) narcissism might also be beneficial in the educational sphere. For example, narcissistic admiration (as measured by the narcissism items from the TOSCA study) has been found to be positively related to mathematics self-concept (Jonkmann et al., 2012). Academic self-concept is—in turn—a predictor of

educational learning, motivation, and performance (e.g., Marsh & Martin, 2011; Marsh & Yeoung, 1997; Seaton, Parker, Marsh, Craven, & Yeung, 2014). Thus, there might be two pathways from (grandiose) narcissism to academic performance: a negative pathway via self-enhancement and a positive pathway via self-concept that cancel each other out (Figure 1.1).

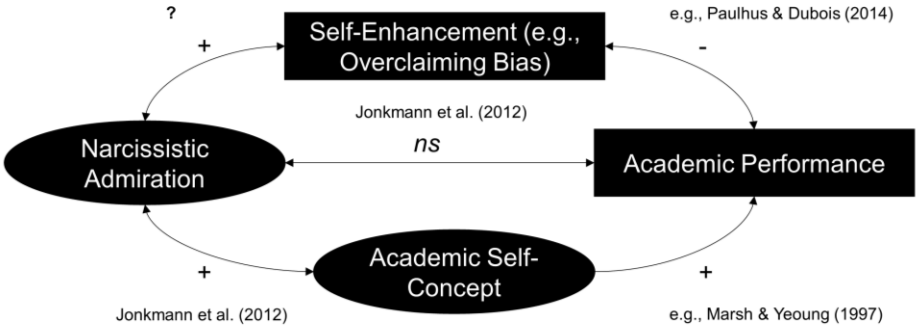

Figure 1.1. Illustration of two potential pathways from narcissistic admiration to academic performance.

Are all dimensions of narcissism positively related to self-enhancement and self-views? Research has suggested that only narcissistic admiration but not narcissistic rivalry or vulnerable narcissism is positively linked to intellectual self-enhancement and academic self-concept. Narcissistic rivalry seems to be related to putting other people down rather than to self-enhancement. People high in narcissistic rivalry tend to harm and devaluate others and engage in deliberate cheating rather than self-enhance in order to reach ego goals such as status, superiority, and power (Back et al., 2013; Brown et al., 2009). Vulnerable narcissism is linked to grandiose fantasies and high standards (e.g., Pincus et al., 2009). However, in contrast to narcissistic admiration (Sedikides et al., 2004), vulnerable narcissism is also associated with a depressive mood and feelings of resentment, anger, shame, and envy (e.g., Pincus et al., 2014). The latter associations suggest that people high in vulnerable narcissism do not self-enhancingly perceive that they have met their grandiose fantasies and standards. In fact, narcissistic rivalry and vulnerable narcissism are negatively correlated with positive self-regard and self-esteem (e.g., Back et al., 2013; Leising et al., 2013). Furthermore, narcissistic rivalry is negatively related to better-than-average self-evaluations (Back et al., 2013). Thus, narcissistic rivalry and vulnerable narcissism might even be negatively related to self-enhancement and academic self-concept.

1.3.2 Narcissism and academic motivation

The three dimensions of narcissism might be related not only to academic self-concept but also to a range of other motivational constructs in the educational sphere. Because all three dimensions of narcissism are characterized by a striving for agentic or ego goals (superiority, uniqueness, grandiosity, fame, status) above communal or non-ego goals (affiliation, tolerance, communal feelings), they might be related to intrinsic/extrinsic motivation (Ryan & Deci, 2000), mastery/performance goals (e.g., Ames 1992; Nicholls, 1984), performance approach/performance avoidance goals (Elliot, McGregor, & Gable, 1999; Kaplan & Maehr, 2007), the regulation of performance approach goals for autonomous/controlled reasons (e.g., Vansteenkiste et al., 2010), task/ego involvement (e.g., Nicholls, 1984), and adaptive/maladaptive or neurotic perfectionism (e.g., Dunkley, Blankstein, Masheb, & Grilo 2006; Hamachek, 1978).

As an example, I will discuss the relationship between narcissism and intrinsic/extrinsic motivation in the following section. Intrinsic aspirations such as self-acceptance, affiliation, and altruism are goals that are congruent with the three basic needs of humans: autonomy, competence, and relatedness (e.g., Ryan & Deci, 2000). On the other hand, extrinsic aspirations such as fame, wealth, and physical attractiveness are characterized by the desire to obtain others' approval and recognition.

The relationship between narcissism and intrinsic motivation is ambiguous. On the one hand, all dimensions of narcissism might be negatively related to intrinsic motivation because they are characterized by a low level of communal motivation (e.g., Campbell & Foster, 2007; Chapters 1.1 and 1.2). A below average communal motivation runs counter to the intrinsic goals of affiliation and altruism and to the intrinsic basic need of relatedness: friendships, family, and getting along with others are less important to people high in narcissism (e.g., Campbell & Foster, 2007). In line with this reasoning, the NPI total score has been found to be negatively related to intrinsic motivation (Kasser & Ryan, 1996). On the other hand, people high in narcissism might also be motivated to increase their autonomy and competence given their agentic motivation (i.e., motivation to achieve superiority, uniqueness). Thus, future studies need to clarify whether narcissism is related to all forms of intrinsic motivation.

Narcissism should be less ambiguously related to extrinsic motivation. All three dimensions of narcissism are characterized by a striving for fame and status (e.g., Campbell &

Foster, 2007; Morf et al., 2000; Chapters 1.1 and 1.2), and thus, all three dimensions should be characterized by the extrinsic motivation to obtain others' approval and recognition. In line with this reasoning, the NPI total score has been found to be positively related to extrinsic motivation (Kasser & Ryan, 1996), and people with high NPI scores want others to confirm their grandiosity (e.g., Horvath & Morf, 2010). Vulnerable narcissism, the dimension that is not well-captured by the NPI, might be even more strongly associated with extrinsic motivation because vulnerable narcissism is most strongly related to a dependence on others' approval and recognition (e.g., Pincus et al., 2009; Zeigler-Hill et al., 2008).

What are the educational consequences of a lack of intrinsic motivation and a highly extrinsic motivation? A lack of intrinsic motivation might be problematic because intrinsic motivation is related to a number of beneficial educational tendencies such as mastery orientation, interest, satisfaction, preference for challenge, engagement, and deep process learning strategies (e.g., Jang, Reeve, Ryan, & Kim, 2009; Yamauchi & Tanaka, 1998). That said, narcissism is related to the aspects of intrinsic motivation (affiliation, altruism, relatedness) that might not be related to these beneficial educational tendencies. A highly extrinsic motivation might lead to task disengagement and self-handicapping to avoid negative feedback and feelings of shame.

1.3.3 Narcissism and academic performance

Narcissistic admiration should be relatively unrelated to academic performance (i.e., grades) because it is associated with performance-decreasing factors (e.g., low intrinsic motivation or self-enhancement tendencies) but also with performance-increasing factors (e.g., high self-concept; Chapter 1.3.1: Figure 1.1). In line with this reasoning, Jonkmann et al. (2012) found that narcissistic admiration is unrelated to math achievement. Furthermore, Westerman et al. (2011) found that the NPI total score—which is more influenced by narcissistic admiration than by the other two narcissism dimensions—was unrelated to grade point average among business and psychology students.

In contrast to narcissistic admiration, vulnerable narcissism and narcissistic rivalry are mainly related to performance-decreasing factors. People high in narcissistic rivalry and vulnerable narcissism have a low academic self-concept (e.g., Back et al., 2013; Pincus et al., 2009) and a high extrinsic motivation (Chapter 1.3.2). Furthermore, albeit people high in

narcissistic rivalry or vulnerable narcissism might be motivated to avoid negative performance feedback, they are usually impulsive and lack a long-term focus (e.g., Back et al., 2013; Wink, 1991). Thus, their avoidance motivation should rather lead to self-handicapping and task disengagement than to studying harder. Taken together, I would expect narcissistic rivalry and vulnerable narcissism to be negatively related to academic performance. To my knowledge, however, no studies have investigated the associations of narcissistic rivalry and vulnerable narcissism with academic performance.

1.3.4 Narcissism and Social Behavior in the Classroom and Other Educational Settings

Narcissism should shape not only students' learning attitude, engagement, and motivation but also classroom group dynamics and students' interactions with peers. The stronger than usual desire for status and power that is common to all three dimensions of narcissism might lead to several more or less problematic classroom behaviors such as aggressive behavior and conduct problems. In fact, the association between narcissism and aggressive behavior is one of the most established findings in the field of narcissism research. Narcissism has been found to predict various forms of aggression in late childhood and adolescence (e.g., Ang, Tan, & Mansor, 2010; Fanti & Kimonis, 2012; Thomaes Stegge, Bushman, Olthof, & Denissen 2008; Barry, Grafeman, Adler, & Pickard, 2007; Ojanen, Findley, Fuller, 2012; Reijntjes et al., 2016; Sargeant, 2013) and in adulthood (e.g., Bushman & Baumeister, 1998; Stucke & Sporer, 2002; Krizan & Johar, 2015; Maxwell, Donnellan, Hopwood, & Ackerman, 2011; Twenge & Campbell, 2003). For example, Reijntjes et al. (2016) found that highly narcissistic boys were more likely to engage in direct and indirect bullying than their peers. Furthermore, in support of the argument that the drive for status and dominance leads to aggression, studies have suggested that the link between narcissism and aggression is mediated by dominance goals (Ojanen et al., 2012). Similarly, a study that distinguished adaptive narcissism (~ narcissistic admiration) from maladaptive narcissism (~ narcissistic rivalry) indicated that both kinds of narcissism predicted bullying behavior in pupils aged 11 to 14 and that these relationships were not mediated by a lack of empathy but by a need for power (Sargeant, 2013).

Even though all three dimensions of narcissism might be related to aggressive and antisocial behavior, narcissistic rivalry should be most strongly related to direct forms of

aggression as its core characteristic is the derogation of others (Back et al., 2013). Narcissistic admiration should be related to only nondefensive, proactive, or instrumental forms of aggression (Kriszan & Johar, 2015). However, even this link to aggression might be mediated by narcissistic admiration's associations with narcissistic rivalry, impulsiveness, sensation seeking, and anger expression (Back et al., 2013; Kriszan & Johar, 2015; Wink, 1991). With regard to vulnerable narcissism, scholars have pointed out that people high in vulnerable narcissism react to threats to their narcissistic self- and world views not only with internalization problems (i.e., shame and depression) but also with anger, mistrust, and narcissistic rage (Kriszan & Johar, 2015). Thus, vulnerable narcissism has been found to be positively related to reactive and displaced aggression (Kriszan & Johar, 2015).

Does narcissism lead to the higher status and influence that people high in narcissism strive for? Studies on adults have suggested that narcissistic admiration leads to initial popularity, and narcissistic rivalry causes a decline in popularity in the long run (Leckelt et al., 2016). However, popularity is not the same as social influence. Narcissistic rivalry might lead to higher social influence in groups not due to popularity but due to dominance, intimidation, and aggression (for a study on the two pathways to social influence in groups, see Cheng, Tracy, Foulsham, Kingstone, & Henrich, 2013).

1.4 The Development of Narcissism in Early Adulthood

1.4.1 The Development of the Big Five Personality Traits

Even though personality traits are relatively stable individual differences, they can also change. Research on personality change has more often focused on the Big Five personality traits than on narcissism. Thus, I will first review the literature on Big Five development during early adulthood before I focus on the development of narcissism.

The traditional view on (Big Five) personality change has been that personality traits are biologically based dispositions that change very little; at least they should not change after the age of 30 (e.g., Costa & McCrae; 1997; see also James, 1890/1950). This view has been challenged in the last three decades by more and more studies that have reported mean-level changes in personality traits (i.e., typical/normative personality changes in a specific age interval). Studies have reported especially strong and robust mean-level changes during early adulthood (i.e., from age 20 to 40). During this phase, people become on average higher in social dominance (i.e., a facet of extraversion), conscientiousness, emotional stability, and agreeableness (for a meta-analysis, see Roberts, Walton, & Viechtbauer, 2006). Nevertheless, McCrae and Costa (2008) have continued to see personality traits as *basic tendencies* that—in contrast to *characteristic adaptations* (e.g., self-concept, attitudes, and roles)—are influenced only by biological factors. Mean-level changes were considered to be part of age-related maturation and degeneration processes and were thus believed to follow intrinsic paths of development independent of environmental influences (e.g., McCrae & Costa, 2008; McCrae et al., 2000). According to this view, only severe environmental influences such as brain injuries would be able to influence personality change (see also Specht et al., 2014).

However, the traditional view that personality is set like plaster after age 30 has been challenged not only by the reported mean-level changes. Longitudinal studies on the development of personality traits have furthermore indicated that individual differences in personality change are related to differences in environments (for a review, see Specht et al., 2014). For example, individual differences in personality change have repeatedly been found to be related to the occurrence of major life events such as entering a romantic partnership or unemployment (for a review on personality change and life events, see Bleidorn, Hopwood, &

Lucas, 2016). Furthermore, genetically informative studies have indicated that changes in personality are partly driven by environmental influences (e.g., Kandler, 2012; Spengler, Gottschling, Spinath, 2012).

Thus, most recent theoretical accounts of personality development assume that not only biological but also environmental factors influence people's personality development. For example, the Neo-Socioanalytic model of personality states that people experience age-related transitions and investments in social and occupational roles in early adulthood. These transitions and new roles lead to an increasing number of expectations from and commitments to friends, family, and coworkers. These expectations and commitments in turn are believed to result in increases in conscientiousness, emotional stability, and agreeableness during early adulthood (Roberts & Davis, 2016; Roberts & Wood, 2006; see also Bleidorn et al., 2013; Hogan & Roberts, 2004). The maturity principle and the social investment principle also provide similar theoretical accounts on the influence of the environment on these personality changes (e.g., Lodi-Smith & Roberts, 2007; Roberts, Wood, & Caspi, 2008).

A few previous studies have also investigated whether individual differences in personality change are related to educational aspects of the environment. One of the largest endeavors to investigate the interplay between the development of personality traits and the educational aspects of the environment is the Transformation of the Secondary School System and Academic Careers study (TOSCA; Köller, Watermann, Trautwein, & Lüdtke, 2004; Trautwein, Neumann, Nagy, Lüdtke, & Maaz, 2010). In this multi-cohort longitudinal study, several thousand students responded to an extensive questionnaire that covered a broad range of personality traits, life events, and educational trajectories every second year from the last year of high school onwards.

Studies based on the TOSCA data have supported the view that educational aspects of the environment are associated with personality change. For example, Lüdtke et al. (2011) found that people who started to work after high school showed larger increases in conscientiousness in their early 20s than people who went to university after high school. Furthermore, in their study, several educational (and noneducational) life events were related to changes in the Big Five. For example, a negatively evaluated *change in or termination of the educational path* was negatively associated with changes in emotional stability, extraversion, and openness. Notably, the association between life events and changes in the Big Five depended on whether the event was

positively or negatively evaluated. Only a negatively but not a positively evaluated *change in or termination of the educational path* was related to changes in any of the Big Five traits.

In another study based on the TOSCA data, Jackson, Thoemmes, Jonkmann, Lüdtke, and Trautwein, (2012) found that military training was related to changes in personality: People who received military training had lower agreeableness scores after the training than a matched control group that did not undergo military training. The differences in agreeableness between the two groups persisted even 5 years after the military training. These findings also suggest that educational contexts can have a long-lasting effect on the development of personality in early adulthood.

In one of the few studies on personality change and education that was not based on TOSCA data, educational demands that occurred before high school graduation were related to changes in conscientiousness (Bleidorn, 2012). The conscientiousness levels of high school students increased during the time when the students were preparing for the Abitur (i.e., the final high school exam in Germany, which serves as a graduation certificate and a university entrance exam). In line with the increases in conscientiousness, the preparation for the final exam requires task and goal orientation, delay of gratification, organization, and persistence.

In summary, research on the development of the Big Five personality traits has revealed that mean-level changes in personality are substantial during early adulthood and occur even after the age of 30. Furthermore, several studies have indicated that changes in the Big Five personality traits are related to certain aspects of the environment (including educational life events and contexts). These findings suggest that environmental demands, major transitions, and meaningful experiences can elicit profound and long-lasting personality changes in young adults. In the current dissertation, I attempted to extend the longitudinal research on the Big Five to a personality trait that is less often studied longitudinally: narcissism.

1.4.2 Mean-Level Development of Narcissism in Early Adulthood

Early adulthood can be a challenging time. Young adults need to gain their independence from the influence of their parents, which means they increasingly need to make decisions autonomously. They need to decide, for example, which social and occupational roles they want to take on. And once they have made these momentous decisions, they need to handle various demands, expectations, and commitments. They need to master normative developmental tasks

during the transition to adulthood, especially to establish themselves within the workplace. But at the same time, they are still highly engaged in ego and identity development.

Given these challenges, how would we expect the mean levels of the three dimensions of narcissism to develop during early adulthood? On the basis of a broad range of literature, Hill and Roberts (2011, 2012) argued that some narcissistic features (e.g., inflated sense of self, individualism, and self-focus) might be adaptive during adolescence and early adulthood. According to this perspective, features of narcissistic admiration might be adaptive during the challenging transition to adulthood. For example, unrealistically positive self-views, optimism, and assertiveness (Back et al., 2013) might provide a buffer against internalization problems (e.g., depression) during the challenging time of early adulthood. In line with this reasoning, Sedikides et al. (2004) found that narcissism (as measured by the NPI) was positively related to psychological health and that this effect was accounted for by self-esteem. Because narcissistic admiration's relationship to self-esteem is similar to that of the NPI, the effects of narcissistic admiration on psychological health might be similar as well. Furthermore, Hill and Roberts (2012) found that the two NPI subscales most similar to narcissistic admiration (NPI Leadership/Authority and NPI Grandiose Exhibitionism) were positively related to life satisfaction in young adults under the age of 25. The associations of the two NPI subscales with life satisfaction were not significant in the age groups comprising people who were older than 25, suggesting that these narcissistic features are helpful during the first years of early adulthood but not thereafter. Furthermore, the higher level of openness to experience among people high in narcissistic admiration (Back et al., 2013) might be adaptive from age 20 to 30 given that this is the time period in which young people in highly industrialized countries such as Germany tend to continue to explore various opportunities rather than committing to social and occupational roles (e.g., Arnett, 2000). Taken together, several features of narcissistic admiration might be adaptive. Thus, the mean levels of narcissistic admiration might tend to be level or even to increase from age 20 to 30.

When the phase of exploration is over and occupational roles have been mastered, narcissistic admiration with its unrealistically positive self-views and focus on agency might be less beneficial than before. Correspondingly, narcissistic admiration might be reduced by social roles that demand an increasing number of expectations from and commitments to friends and family (for a similar argument, see Roberts, Edmonds, & Grijalva, 2010). Hence, at least from

the age of 25 onwards, narcissistic admiration might be increasingly maladaptive and might thus be expected to decrease.

In contrast to narcissistic admiration, both narcissistic rivalry and vulnerable narcissism might be maladaptive and might thus decrease across the entire phase of early adulthood. Narcissistic rivalry and vulnerable narcissism do not embody the features of narcissistic admiration that might be helpful during the challenging transition to adulthood (optimism, self-esteem; e.g., Back et al., 2013; Pincus et al., 2009). On the contrary, features related to narcissistic rivalry and vulnerable narcissism such as dysfunctional relationships (Back et al., 2013) and emotional dysregulation (Krizan & Johar, 2012) might be risk factors for a derailed development during early adulthood. Accordingly, narcissistic rivalry and vulnerable narcissism—which share features that are often perceived as immature (e.g., Buchanan & Holmbeck, 1998)—should be curbed by the expectations, demands, and commitments that come along with social and occupational roles (see also Neo-Socioanalytic model, social investment theory, and maturity principle; e.g., Roberts et al., 2010; Roberts & Wood, 2006; Roberts et al., 2008). In line with this reasoning, the two Big Five traits that are substantially negatively related to narcissistic rivalry and vulnerable narcissism (i.e., agreeableness and emotional stability; Back et al., 2013; Miller et al., 2016) have been repeatedly found to increase during early adulthood (e.g., Roberts et al., 2006; Lüdtke et al., 2011). In summary, past research has suggested that narcissistic rivalry and vulnerable narcissism are rather maladaptive during early adulthood and should thus decrease from age 20 to 40.

Unfortunately, the development of narcissistic admiration, narcissistic rivalry, or vulnerable narcissism during early adulthood has not been directly investigated in previous studies. However, there are some cross-sectional and longitudinal studies that have investigated the development of narcissism as measured by the NPI. These studies have revealed rather mixed findings. On the one hand, cross-sectional studies have suggested that narcissism declines in early adulthood: Several researchers have reported negative relationships between age and total scores on the NPI (e.g., Foster, Twenge, & Campbell, 2003: r = -.17; Hill & Roberts, 2012: r = -.32; Roberts, Edmonds, & Grijalva, 2010: r = -.32). On the other hand, two longitudinal studies on narcissism in early adulthood did not find declining trends: Carlson and Gjerde (2009) studied narcissism in young adulthood using a Q-sort methodology (Block, 1961). They detected no significant decrease in narcissism from age 18 to 23. Orth and Luciano (2015) reported virtually

no descriptive differences in NPI scores across a 2-year period during early adulthood consisting of four measurement occasions. But admittedly, the two longitudinal studies were concerned with only the first years of early adulthood.

Taken together, research and theory on the development of narcissism during early adulthood is scare. On the basis of the features inherent to the three dimensions of narcissism, I would expect the mean levels of the three dimensions to decline during early adulthood: An increasing number of social and occupational commitments and expectations should curb narcissistic tendencies, at least after the initial years of early adulthood from age 30 to 40. In line with this reasoning, cross-sectional studies have suggested a decline in narcissism in early adulthood. Conversely, longitudinal studies have suggested that narcissism does not increase or decrease in the first years of early adulthood. However, the time frames explored in these longitudinal studies have been too short to draw any solid conclusions.

1.4.3 Narcissism Development, the Studying of Economics, and Life Events

1.4.3.1 Economics majors

An environmental context that I have not discussed yet but that might be related to the development of the three dimensions of narcissism is the university major. In particular, the choice to major in economics might be related to the development of narcissism because students from economics majors have been found to have higher NPI scores than students from other majors (Westerman et al., 2011; but see also Sautter, Brown, Littvay, Sautter, & Bearnes, 2008).

That said, even if economics students are higher in narcissism, it remains unclear whether students from economics majors are higher in narcissism (a) because high school students who are high in narcissism tend to decide to major in economics more often than students low in narcissism, (b) because studying economics makes students more narcissistic, or (c) both. Here, we encounter the distinction between two effects that are often labeled *selection* and *socialization effects* in research on personality development (e.g., Headey & Wearing, 1989; Roberts & Robins, 2004). *Selection effects* refer to the influence of narcissism on the likelihood of experiencing a certain environment: to select or to be selected by a certain environment. S*ocialization effects* refer to the influence of certain environments or experiences on the

development of narcissism. With regard to studying economics, there are reasons and evidence for both of the effects.

Individuals high in narcissism might be more likely to *select* an economics major because studying economics requires and rewards characteristics that are related to narcissism. Persons high in narcissism are motivated to achieve agentic or ego goals (superiority, uniqueness, grandiosity, fame, status) above communal or non-ego goals (affiliation, tolerance, communal feelings; e.g., Campbell & Foster, 2007; Crocker & Park, 2004; Miller & Campbell, 2008; Morf et al., 2000; Wink, 1991). Such motivations might enhance a person's likelihood of selecting an economics major because the economics domain emphasizes agency and neglects communion, gives access to extensive resources and future leadership positions, and thus has the potential to satisfy narcissistic goals.

Higher levels of narcissism among economics students might also be the consequence of socialization effects. Studying business and economics might foster narcissism because economics majors tend to embody the core characteristics of narcissism such as competitiveness (Luchner, Houston, Walker, & Houston, 2011), selfishness (Brown, Sautter, Littvay, Sautter, & Bearnes, 2010), an agentic focus, and a neglect of communal goals (e.g., Campbell & Foster, 2007). The field of business and economics is dominated by neoclassic economics with its focus on self-interest, pleasure, and consumer goods (Etzioni, 2015). And the bedrock of economics (i.e., rational-choice theory) characterizes humans as self-interested agents. This has most prominently been bemoaned by Kahneman, Knetsch, and Thaler (1986):

> The absence of considerations of fairness and loyalty from standard economic theory is one of the most striking contrasts between this body of theory and other social sciences—and also between economic theory and lay intuitions about human behavior. (p. 285)

As the assumption of selfishness and rationality have still been the cornerstones of most economic analyses thirty years later (Kahneman, 2003), the studying economics might foster narcissism.

There is no direct evidence that choosing to major in economics has an influence on narcissism, but longitudinal studies on ethical behavior have suggested that choosing this major might have an influence on narcissism. Longitudinal studies on ethical behavior have indicated that (a) the level of cooperation increased more strongly for noneconomics students than for economics students between the freshman and senior years, and (b) students who attended a

class on game theory became more cynical and less honest over the course of one semester than students who took an astronomy class (Frank, Gilovich, & Regan, 1993). More recently, Faravelli (2007) found that senior economics students were less likely to support egalitarian solutions to distribution problems than freshman economics students. Even though some other studies have been less conclusive regarding the socialization effects of studying economics on unethical tendencies (for a review, see Etzioni, 2015), the choice to study economics might be positively linked to changes in narcissism in early adulthood.

1.4.3.2 Life Events

Selection and socialization effects might also occur with regard to life events. Life events include (a) normative transitions in life such as graduating from high school or starting regular work after graduation, (b) meaningful changes such as transferring to another university or quitting smoking, and (c) major individual experiences such as winning an academic award (e.g., Sarason, Johnson, & Siegel, 1978; Specht, Egloff, & Schmukle, 2011; Vaidya, Gray, Haig, & Watson, 2002). Although life events were traditionally seen as events that occur independently of one's personality, an increasing number of studies have demonstrated that personality traits can predict the occurrence of life events (e.g., Headey & Wearing, 1989; Lüdtke et al., 2011; Specht et al., 2011). Narcissism might predict how frequently (negative) life events occur because it has been found to be positively related to impulsivity (Vazire & Funder, 2006), risky behavior (Foster, Shenesey, & Goff, 2009), and approach motivation as well as negatively related to avoidance motivation (e.g., Foster, Misra, & Reidy, 2009; Foster & Trimm, 2008). In fact, one of the few studies that included narcissism as a predictor of life events found a selection effect of narcissism on the occurrence of stressful life events (Orth & Luciano, 2015). Thus, narcissism might also predict other (negative) life events.

However, the main focus of this dissertation was not on selection effects but on socialization effects: How are life events linked to individual differences in the development of narcissism during early adulthood? Relevant life events have hardly ever been identified in previous research. Orth and Luciano (2015) tested whether experiencing stressful life events is linked to changes in narcissism in early adulthood but did not find evidence for it. In a prospective longitudinal study with children, Brummelman et al. (2015) found that when parents believe their children are more special and entitled than other children, narcissism increases over

time. Thus, Brummelman et al. (2015) concluded—with reference to social learning theory—that an overvaluation by one's parents fosters narcissism (see also e.g., Otway & Vignoles, 2006; Thomaes, Brummelman, Bushman, & Reijntjes, 2013). However, we do not know whether and how this finding could be transferred to the phase of early adulthood.

Thus, my reasoning was guided by tendency of people high in narcissism to desire agentic or ego goals (superiority, uniqueness, grandiosity, fame, status) above communal or non-ego goals (affiliation, tolerance, communal feelings; e.g., Campbell & Foster, 2007; Crocker & Park, 2004; Miller & Campbell, 2008; Morf et al., 2000; Wink, 1991). My general supposition was that narcissism in early adulthood is fostered by life events that reward and demand a motivation high in agency (i.e., events positively related to competence, extraversion, uniqueness, separation, and focus on the self) and events that reward and demand a motivation low in communion (i.e., events negatively related to warmth, agreeableness, relatedness, connection, and focus on others; Gebauer et al., 2012; see also Bakan, 1966). Positive agentic events and negative communal events might reinforce the emphasis on the agency and the ignorance of the communion domain, respectively. Thus, positive agentic and negative communal events should foster narcissism, whereas negative agentic and positive communal events should curb narcissism.

Taken together, I expected changes in narcissism to be positively associated with studying economics at university and the occurrence of positive agentic events and negative communal events. Furthermore, I expected changes in narcissism to be negatively associated with the occurrence of negative agentic events and positive communal events. That said, on the basis of the existing research on narcissism, it was very difficult to derive expectations about the influence of the environment on the development of narcissism. Clearly, there is a need for longitudinal studies on narcissism, especially in early adulthood.

1.5 Research Questions and Outline of Studies

The current dissertation investigated the assessment, dimensionality, and development of narcissism in early adulthood. Studies 1 and 2 investigated the assessment and dimensionality of narcissism because previous research did not clearly indicate the best way to assess narcissism or how many dimensions of narcissism exist (Chapter 1.2). Previous research has indicated that the most established narcissism questionnaire, the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979; Raskin & Terry, 1988), is not unidimensional. However, previous research has failed to come to an agreement on the dimensionality and subscale structure of the NPI—various NPI subscales have been proposed since the initial creation of the NPI when researchers realized that the NPI was not unidimensional (e.g., Raskin & Terry, 1988). Thus, it is not clear how many dimensions underlie the NPI or the construct of narcissism in general.

As a response to the psychometric issues of the NPI, Back et al. (2013) developed the Narcissistic Admiration and Rivalry Questionnaire (NARQ). In contrast to the NPI, The NARQ was created on the basis of a theory about grandiose narcissism: the Narcissistic Admiration and Rivalry Concept (Back et al., 2013). Furthermore, in contrast to the NPI, the NARQ was not created as a unidimensional questionnaire but as a questionnaire that clearly differentiates between two dimensions: an assertive dimension (i.e., narcissistic admiration) and an antagonistic dimension (i.e., narcissistic rivalry). The initial validation studies by Back et al. (2013) suggested that the NARQ has higher concurrent and predictive validity than the NPI. However, it remains unclear whether the NARQ outperforms the NPI only with regard to validity but also with regard to other psychometric properties.

Study 1 addressed this question by comparing the NPI and NARQ subscales with regard to *closeness to unidimensionality* and *measurement precision*. Both the NPI and NARQ are believed to measure only grandiose narcissism but not vulnerable narcissism (e.g., Back et al., 2013; Miller et al., 2011). Because the NARQ, but not the NPI, was developed on the basis of a theory that is believed to appropriately describe the structure of grandiose narcissism, we expected the NARQ subscales to show superior closeness to unidimensionality and measurement precision compared with the NPI subscales. In other words, if the two-dimensional narcissism structure (narcissistic admiration and rivalry) that is believed to underlie the NARQ is an

appropriate and comprehensive depiction of grandiose narcissism, the NARQ should outperform the NPI psychometrically.

Study 2 again addressed the assessment and dimensionality of narcissism. We investigated whether the three proposed dimensions of narcissism (i.e., narcissistic admiration or assertive narcissism, narcissistic rivalry or antagonistic narcissism, and vulnerable narcissism) would show different correlations with a potential behavioral consequence of narcissism: overclaiming bias (i.e., the tendency to illegitimately claim knowledge). On the basis of previous findings (Chapter 1.3.1), we hypothesized that assertive narcissism but not antagonistic and vulnerable narcissism would be positively related to overclaiming bias. If the various dimensions of narcissism were found to have different associations with overclaiming bias, this would further underscore the need to distinguish between the various dimensions of narcissism.

Although Studies 1 and 2 clarified measurement questions and emphasized the importance of distinguishing between various dimensions of narcissism when predicting behavior, they were cross-sectional and were thus not able to shed light on the development of narcissism and how its development is related to the environment. Previous research has indicated that the Big Five personality traits show strong and robust mean-level changes during early adulthood (e.g., Roberts et al., 2006). Furthermore, research on the Big Five has suggested that the development of personality traits is shaped by the environment (i.e., socialization effects; e.g., Lüdtke et al., 2011; Jackson et al., 2012; Chapter 1.4). However, little research has investigated the development of narcissism and the interplay between the development of narcissism and the environment.

Study 3 addressed these and similar questions by investigating (a) the general developmental trends of narcissism in early adulthood (i.e., mean-level changes) and (b) socialization effects (i.e., influence of certain environments or experiences on the development of narcissism). In particular, in Study 3, we examined how choosing an economics major at university and the occurrence of any of 30 life events were related to the development of narcissism in early adulthood.

To investigate the development of narcissism, in Study 3, we analyzed two cohorts from the TOSCA study (Transformation of the Secondary School System and Academic Careers study; Köller et al., 2004; Trautwein et al., 2010). The TOSCA study tracks changes in the narcissistic admiration of several thousand German students on multiple occasions from their last

year of high school—before the students enter tertiary education—to around the age of 30. The focus in Study 3 was exclusively on narcissistic admiration because the other two dimensions of narcissism (narcissistic rivalry and vulnerable narcissism) were not assessed in the TOSCA study. However, another "dark" personality trait, Machiavellianism (i.e., the tendency to hold a cynical view of the world, a duplicitous interpersonal style, and pragmatic morality) has also been assessed in the TOSCA study. As narcissistic admiration and Machiavellianism are related constructs (i.e., both are characterized by a preference for agentic over communal goals), Study 3 also examined the development of Machiavellianism. The extensive assessments of the TOSCA study enabled a thorough investigation of the development of narcissistic admiration and Machiavellianism during early adulthood.

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2

Study 1: A Comparison of Unidimensionality and Measurement Precision of the Narcissistic Personality Inventory and the Narcissistic Admiration and Rivalry Questionnaire

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Abstract

The current study compares the closeness to unidimensionality (CU) and measurement precision (MP) of the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979)—with either a pairwise forced-choice or 5-point Likert scale response format—to the Narcissistic Admiration and Rivalry Questionnaire (NARQ; Back et al., 2013). Minimum rank factor analysis and item information curves from item response models were utilized. The results mainly confirmed our expectations that NPI subscales are lower in CU and MP compared to NARQ subscales when the NPI was administered with its traditional forced-choice response format. When the NPI was administered with a 5-point Likert scale response format, the NPI subscale Leadership/Authority and NPI Grandiose Exhibitionism showed similarly high levels of CU and MP as the two NARQ subscales. While the NPI subscale Entitlement/Exploitativeness had a higher CU than the NARQ subscales it showed considerably lower levels of MP.

Keywords: narcissism; unidimensionality; measurement precision; item response theory; explained common variance; reliability;

2. A Comparison of Unidimensionality and Measurement Precision of the Narcissistic Personality Inventory and the Narcissistic Admiration and Rivalry Questionnaire

2.1 Introduction

Several researchers bemoan that the original item creation and item selection strategy of the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979) did not take into account the multidimensional nature of grandiose narcissism (e.g., Back et al., 2013; Brown, Budzek, & Tamborski, 2009; Raskin & Terry, 1988): The NPI items were selected out of a large pool of narcissism items with the exclusive aim to increase internal consistency and without specific dimensions or subscales in mind. Nevertheless, NPI subscales were proposed later on, as empirical evidence suggested multiple factors underlying the NPI (e.g., Ackerman et al., 2011; Corry, Merritt, Mrug, & Pamp, 2008; Raskin & Terry, 1988). Because NPI subscales were obtained post-hoc rather than by design, the NPI items of the proposed subscales might load not only on one specific factor but also on other factors. Due to this within-item multidimensionality the proposed NPI subscales are expected to be relatively low in closeness to unidimensionality (CU), which may impair the interpretability of the NPI subscale scores.

In contrast to the NPI, the Narcissistic Admiration and Rivalry Questionnaire (NARQ, Back et al., 2013) was developed based on a theory that clearly differentiates two dimensions of grandiose narcissism: the Narcissistic Admiration and Rivalry Concept (Back et al., 2013). Accordingly, the NARQ items were created for specific subscales, Narcissistic Admiration and Narcissistic Rivalry, respectively. Thus, the two NARQ subscales might show a higher CU than NPI subscales, an assertion put to an empirical test in the current study.

CU gives insight into the unidimensionality of a scale, but it does not inform us with how much precision the underlying dimension is measured (e.g., Nunnally, 1978; Tang, Cui, & Babenko, 2014). Even when the CU is high, measurement precision (MP) might be low if the amount of error or item-

specific variance is disproportionally high. Therefore, the current study additionally investigates the MP of NPI and NARQ subscales.

2.1.1 Closeness to Unidimensionality

CU is defined as the proportion of *common variance* that is explained by the first factor in a factor analysis (Ten Berge & Sočan, 2004; see also Shapiro & Ten Berge, 2002), where the common variance is the variance explained by all factors. For example a CU of .85 means that the first factor explains 85% of the common variance in item response behavior, which is a relatively high level of CU. A low CU (e.g., less than .50) means that less than half of the common variance is explained by the first factor. It is crucial that the data of a scale show high CU for at least two reasons.

(1) A high CU facilitates a clear interpretation of scale scores (i.e., sum or average of the scores on all scale items). A low CU hampers the interpretation of scale scores because more than one latent attribute might have a strong influence on the scale score; thus it is unclear how each latent attribute is influencing the scale score (e.g., Briggs & Cheek, 1986; Reise, Bonifay, & Haviland, 2013; Stout, 1987). Imagine Person A scored on average higher than Person B on a set of narcissism items that assessed two attributes—exhibitionism and vanity. In this case, it is unclear whether Person A scored higher than Person B because of a higher standing on exhibitionism, on vanity, or on both. Unless exhibitionism and vanity are very highly associated, the scale score is not clearly interpretable in terms of its constituent components.

In addition, it remains unclear whether an association between the scale score of item responses with low CU and a specific behavioral outcome is driven by all or only some of the underlying dimensions of that item set. Some dimensions of the item set might not show the association found for the scale score, which is often observable when a scale is split up into subscales. For example, Ackerman et al. (2011) found that the NPI total score correlates positively with self-esteem while the Entitlement/Exploitativeness subscale of the NPI did not correlate with self-esteem at all.

An existing association between the scale score and a behavior of interest might even be masked if some of the dimensions of the scale are positively associated with the behavior while other dimensions are negatively associated to that behavior. For example, Briggs and Cheek (1986) split up the self-monitoring scale into subscales and showed that some subscales are *negatively* related to social anxiety while other subscales are *positively* related to social anxiety. As the two associations canceled each other out, the total scale score—that was often exclusively used before 1986—was largely unrelated to social anxiety.

(2) Many measurement models in structural equation modeling assume unidimensionality. A violation of the unidimensionality assumption biases parameter estimates (e.g., too high loadings, too low error estimates) and thus relations among measured variables might be inaccurate (i.e., structural coefficient bias; Reise, Bonifay, et al., 2013; Reise, Scheines, Widaman, & Haviland, 2013). To decide whether the data are "unidimensional enough" to prohibit severe bias in model parameters, researchers commonly look at the model fit statistics of a structural equation model. However, fit indices have several confounds and limitations (e.g., Reise, Scheines, et al., 2013; Saris, Satorra, & Van der Veld, 2009; West, Tailor, & Wu, 2012). Reise, Scheines, et al. (2013) showed that the fit indices RMSEA, SRMR, and CFI—in combination with the percentage of contaminated correlations among items—are less prognostic of parameter bias in structural equation modelling than CU in combination with the percentage of contaminated correlations. It seems more useful then to assess the degree of CU rather than inspecting fit indices to investigate the strength of structural coefficient bias.

Taken together, low CU might cause (1) an ambiguous interpretation of scale scores and their associations and (2) coefficient bias in structural equation modeling. Thus, scales with response data that show low CU may be more appropriately modeled as multidimensional, split up into subscales, revised, or abandoned altogether.

2.1.2 Is the NPI Close to Unidimensionality?

The NPI was created based on DSM-III behavioral criteria for narcissistic personality (Raskin & Terry, 1988), which was based on clinical observations of narcissistic phenomena (Tyrer, Reed, & Crawford, 2015). Out of a larger item pool of 220, 54 items were selected with the exclusive aim to increase internal consistency of the total scale to represent a general construct of narcissism (Raskin & Terry, 1988). However, the selection of items only reduced—but did not eradicate—the heterogeneity of the total scale (Raskin & Terry, 1988). Raskin and Terry (1988) attempted to eliminate this flaw by selecting 40 out of the 54 items highlighted in a principal component analysis. Unfortunately, their attempt (and later attempts) to resolve the issue yielded neither the desired unidimensionality for the 40 NPI items nor a factor structure that was confirmed by later studies.

Aside from the review and study by Raskin and Terry (1988), ample research suggests that data for the NPI total scale is low in CU. That is, researchers have repeatedly found more than one factor in exploratory factor analyses (e.g., Ackerman et al., 2011; Ackerman et al., 2016; Brown et al., 2009; Corry et al., 2008) and different facets of the NPI show different correlations with external criteria (e.g., Ackerman et al., 2011; Brown et al., 2009; Exline, Baumeister, Bushman, Campbell, & Finkel,

2004; Zeigler-Hill & Besser, 2013). Hence, many researchers have proposed NPI subscales (e.g., Ackerman et al., 2011; Corry et al., 2008). However, are responses to the NPI subscales high in CU?

This question has rarely been addressed in previous studies. Ackerman et al. (2012) concluded based on a bifactor analysis that the unidimensionality assumption holds for several NPI subscales (and the NPI total scale) before they conducted an item response theory (IRT) analysis. However, they did not test how close to unidimensionality the NPI subscales were.

The NPI subscales seem to be relatively low in CU because different studies proposed different factor structures for the NPI. The lack of consistency of factor structure across studies might be partly caused by different methods and criteria used to investigate the factor structure and/or by sampling error. However, if the NPI subscales were high in CU, we would expect the same subscale structure to emerge regardless of the method, criteria, and sampling error.

2.1.3 Do the NARQ Subscales Show a High Degree of Closeness to Unidimensionality?

The NARQ was also designed to measure grandiose narcissism but—in contrast to the NPI—the construction was based on a theory that explicitly distinguishes between the self-promoting or assertive aspects of grandiose narcissism (narcissistic admiration) and the other-derogative or antagonistic aspects of grandiose narcissism (narcissistic rivalry; Back et al., 2013). Back and colleagues' subscale-specific test construction approach seems promising and initial evidence suggests that the two NARQ subscales have a higher concurrent and predictive validity than the NPI subscales (Back et al, 2013; but see also Miller et al., 2014). For example, the NARQ outperformed the NPI in predicting self-reported interpersonal orientations and close relationship conflict and observer-rated agentic and communal behavior. Even though we would expect the NARQ subscales to outperform the NPI subscales with regard to CU, this possibility has not been empirically tested.

2.1.4 Measurement Precision at Different Levels of the Latent Trait

In classical test theory, MP is reflected by the standard error of measurement (i.e., the estimated standard deviation expected for observed scores when the true score is held constant; Dudek, 1979). This is a single value of precision that is used for all persons regardless of their true score level. Because this single value does not allow for variability in MP across score levels, it has become standard to report IRT based item- and test information curves as additional indicators of MP. The test

information may vary across the trait scale and it is inversely related to the standard errors of IRT scores. The more information an item or set of items provides at a specific trait level, the smaller the standard error of latent trait estimates of respondents who score in that trait range (Embretson & Reise, 2000). For example, the NARQ Narcissistic Rivalry item "Other people are worth nothing" might estimate the level of rivalry more precisely in people high in rivalry than in people low to medium in rivalry. The item will not differentiate well between people low and medium in rivalry because almost all people low or medium in rivalry will choose the lowest response category (i.e., "not agree at all"). However, it will potentially differentiate very well between high and very high levels of rivalry because people high and very high in rivalry might vary in their responses.

High MP is a crucial feature not only for assessing narcissism in clinical settings, where it entails narrow confidence intervals of individual diagnosis (e.g., Embretson, 1996), but also for empirical research. The higher the average MP in a sample, the higher the reliability and thus the lower the number of participants required to conduct empirical studies with sufficient power and without bias in parameter or standard error estimates (e.g., Wolf, Harrington, Clark, & Miller, 2013; Zimmerman & Williams, 1986). Furthermore, if MP is low at particular ranges of the latent variable, the results of a scale can be distorted even if the scale has an acceptable Cronbach's alpha. For example, Fraley, Waller, and Brennan (2000) showed in a data simulation that low precision in the low latent trait area can lead to misleading results with regard to trait stability over time even if alpha is as high as .81. Thus, researchers interested in changes in narcissism over time likely want to know to what extent the NPI and NARQ subscales show an acceptable MP across the latent trait continuum.

We expect the NPI subscales to have lower MP than the NARQ subscales as the forced-choice response format of the NPI, which involves a choice between two alternatives, is disadvantageous compared to the 6-point Likert scale format of the NARQ. The reason is that item information can be increased with the addition of response categories (Koch, 1983; Samejima, 1969). Furthermore, the MP of some NPI subscales might be lower because of their shorter test length (e.g., the NPI Entitlement/Exploitativeness subscale is comprised of four items; Ackerman et al., 2011) compared to the two NARQ subscales with nine items each. Third, the absence of a multifaceted theory on narcissism when constructing the NPI might have hampered not only the CU but also the discriminative power of NPI subscale items, which lowers their MP. For all these reasons, we expect the NPI subscales, particularly the Entitlement/Exploitativeness subscale, to be lower in MP than the NARQ subscales.

2.1.5 The Present Study

The current study empirically tests and compares the CU and MP of NPI and NARQ subscales. We focus on the subscales instead of the total scales because the NPI total scale has already been found to lack CU (e.g., Ackerman et al., 2011) and the NARQ was not developed as a single unidimensional measure (Back et al., 2013). Particularly, we will compare the CU and MP of the three NPI subscales proposed by Ackerman et al. (2011), Leadership/Authority, Grandiose Exhibitionism, and Entitlement/Exploitativeness, to the CU and MP of the two NARQ subscales, Narcissistic Admiration and Narcissistic Rivalry. We used the Ackerman et al. (2011) NPI subscale structure for the comparison because it is—in contrast to other subscale structures—based on a large sample and validated by exploratory and confirmatory factor analysis, nomological network analysis, and self- and other reported personality and behavior. We additionally report the CU and MP for NPI subscales proposed by Ackerman et al. (2016), Corry et al. (2008), and Raskin and Terry (1988) in Chapter 2.6 (Table 2.3; Figures 2.3 to 2.5).

In order to assess CU, minimum rank factor analysis was used to calculate the explained common variance (ECV; Ten Berge & Kiers, 1991). Minimum rank factor analysis was based on tetrachoric or polychoric correlations to account for the categorical response format of the items. Similarly, in order to assess MP, the current study uses IRT rather than classical indicators of MP such as Cronbach's alpha or the average inter-item correlation (Cronbach, 1951) because the logistic IRT models are more adequate for the analysis of the categorical NPI and NARQ items than the linear models.

To examine the generalizability of our results, we analyzed NPI and NARQ data from a German (Sample 1) and from a US sample (Sample 2). Furthermore, using NPI data from another US sample (Sample 3), we investigated the CU and MP of an NPI version that was *not* administered with the traditional pairwise forced-choice response format but, similar to the NARQ, with a 5-point Likert scale response format. The reason why we compared the NPI data with a 5-point Likert scale, and not NPI data with a 6-point Likert scale, to NARQ data with its 6-point Likert scale (Sample 1 and 2) was that only 5-point Likert scale NPI data with an adequate sample size were available. Although using the exact same Likert scale would have been preferable, the comparison should provide a close enough estimation regarding to what extent differences in CU and MP can be explained by differences in response format. That said, the influence of the response format is not a core question of the current study (see Ackerman et al., 2016; Boldero, Bell, & Davies, 2015; Wetzel, Roberts, Fraley, & Brown,

2016 for studies that investigated the influence of response format on the psychometric properties of the NPI).

2.2 Method

2.2.1 Participants and Procedure

Sample 1 comprised 1,949 German speaking Internet users (65% females; 1856 complete responses); a subsample of Sample 1 has been used in Back et al. (2013). Sample 2 comprised 695 US American University students (56% females; 666 complete responses) from a lab-based study examining the effects of narcissism on emotional interference (i.e., a Stroop Task; not previously published). Sample 3 comprised 5,234 English speaking Internet users (70% females; 5,232 complete responses) who filled out an autoscoring personality test about narcissism at www.yourpersonality.net. The complete Sample 3 was analyzed in full by Wetzel et al. (2016) and a portion of the data was also analyzed by Ackermann et al. (2016). The first two samples filled out the NPI and NARQ with the original item and response format. The third sample answered NPI items with a 5-point Likert scale response format but did not answer any NARQ items.

In all three samples, participants received research participation credit, personality feedback for their participation, and/or took part in a lottery as an incentive. The mean age was 26.7 (range: 18-73) in Sample 1, 18.9 (range: 16-27) in Sample 2, and 30.7 (range: 18-75) in Sample 3.

The data for Sample 1 and 2, the R syntax, and supplemental figures and tables are available at the Open Science Framework: https://osf.io/xg6gn. The data for Sample 3 is available at https://osf.io/khrn2 (file name: "rating_scale_data_npi_facets.dat").

2.2.2 Measures

2.2.2.1 The Narcissistic Personality Inventory (NPI)

The NPI consists of 40 pairwise forced-choice items in which participants select one out of two options, a narcissistic and a non-narcissistic one. In the 5-point Likert scale version (Sample 3), participants read each narcissistic and non-narcissistic statement separately and indicated how much they agreed with each statement, resulting in 80 5-point Likert scale items. In the current study, we

only analyzed the responses to the 40 Likert items with narcissistic indicative statements because the NARQ also comprises exclusively of narcissistic indicative statements.

The three subscales proposed by Ackerman et al. (2011) are Leadership/Authority (eleven items, e.g., Item 10: narcissistic indicative answer "I see myself as a good leader" vs. non-narcissistic indicative answer "I am not sure if I would make a good leader."), Grandiose Exhibitionism (ten items; e.g., Item 7: narcissistic answer "I like to be the center of attention" vs. non-narcissistic answer "I prefer to blend in with the crowd"), and Entitlement/Exploitativeness (four items; e.g., Item 24: narcissistic answer "I expect a great deal from other people" vs. non-narcissistic answer "I like to do things for other people"). We needed to exclude one item, Item 30, from the Grandiose Exhibitionism subscale because the content of Item 30 (narcissistic answer "I really like to be the center of attention" vs. non-narcissistic answer "It makes me uncomfortable to be the center of attention") overlaps considerably with the content of Item 7 (see above). The exclusion was necessary because the overlap caused large item misfit, poor model fit, correlated residuals, and inflated information curves (for results of the full scale, see Chapter 2.6: Tables 2.4 to 2.7 and Figure 2.6; see also Ackerman et al., 2012).

2.2.2.2 The Narcissism Admiration and Rivalry Questionnaire (NARQ)

The NARQ consists of 18 items, scored from 1 = "not agree at all" to 6 = "agree completely". According to Back et al. (2013), the NARQ measures two dimensions of narcissism: narcissistic admiration (e.g., Item 1: "I am great.") and narcissistic rivalry (e.g., Item 9: "I want my rivals to fail."). Each dimension is measured by nine items, including three cognitive, three affective-motivational, and three behavioral items.

2.2.3 Data Analysis

2.2.3.1 Closeness to Unidimensionality

The CU analyses were based on tetrachoric (dichotomously scored items) and polychoric correlation matrices (polytomously scored items), respectively (Olsson, 1979). Tetrachoric or polychoric correlations are developed for discrete responses, assuming multivariate normality at the latent variable level. We used polychoric correlations instead of Pearson correlations because factor analysis based on polychoric correlations (but not factor analysis based on Pearson correlations) can

adequately estimate the loadings of the NPI and NARQ items that show floor or ceiling effects (e.g., floor effect of the very unpopular NARQ item "Other people are worth nothing") (e.g., Garrido, Abad, Ponsoda, 2013; Kubinger, 2003). Because tetrachoric or polychoric correlations do not allow missing values, incomplete responses were not included (i.e., listwise deletion) in the CU analyses.

Following Morizot, Ainsworth, and Reise (2009), we assessed CU in more than one way. First, we investigated the explained common variance (ECV) under the one-factor minimum rank factor analysis model. Second, a one-factor confirmatory factor analysis model was fit to data of each subscale and model fit indices and the residual correlations were inspected. The focus will be on the ECV as it aligns most closely to the definition of CU.

2.2.3.2 Explained Common Variance

The ECV was obtained by calculating the percentage of common variance that is explained by the first factor of the reduced correlation matrix, which is based on the one-factor solution of a minimum rank factor analysis (Ten Berge & Sočan, 2004; see also Shapiro & Ten Berge, 2002). More specifically, let J be the number of items indexed by j, and let λ_j (j = 1 ,…, J) be the eigenvalues of the reduced inter-item correlation matrix. The ECV equals the ratio of the first eigenvalue to the sum of all eigenvalues, times 100 to yield percent:

$$\mathrm{ECV} = \frac{\lambda_1}{\lambda_1 + \ldots + \lambda_J} \times 100 \qquad (1)$$

The denominator in Equation 1 is the common variance, which is the part of the total variance that is explained by all factors in the minimum rank factor analysis. The part of total variance that is not present in the equation because it is explained by none of the factors is the error or item-specific variance. Common and error variance always add up to 100% (i.e., total variance).

The ECV, common variance, and error variance of each minimum rank factor analysis were calculated using the PC software package FACTOR (version 9.3.1; Lorenzo-Seva & Ferrando, 2006). Minimum rank factor analysis (Ten Berge & Kiers, 1991) was used instead of other factor analytic methods, such as principal axis factor analysis, because the reduced correlation matrix of the latter methods may be non-positive definite (i.e., some eigenvalues are negative) and thus the ECV cannot be properly computed (Lorenzo-Seva, 2013; Shapiro & Ten Berge, 2002).

An ECV of 100 would indicate perfect unidimensionality; that is, that 100% of the common variance can be explained by only one factor. However, a value of 100% is unrealistic given that minor

common factors are normally present (MacCallum & Tucker, 1991). There are no generally accepted benchmarks developed for the ECV yet. Reise, Scheines, et al. (2013) examined the role of the ECV in a simulation study investigating the influence of measurement model misspecification on structural parameter bias in structural equation modelling. Based on their results, they proposed an ECV of 60% as a tentative benchmark for cases when more than 20% of the item-pair correlations are contaminated by the specification of a unidimensional measurement model to data with a multidimensional bifactor structure. Correlations between item-pairs are contaminated when the model-implied correlations deviate from the observed ones, that is, when the item-pair correlation is not sufficiently modeled by the specified general factor. For NPI and NARQ subscales that had an ECV below 60%, we investigated the percentage of contaminated item-pair correlations based on the number of loadings ≥ .20 on group factors in exploratory bifactor models (see also Reise, Scheines, et al., 2013; Schmid & Leiman, 1957). To run these bifactor analyses, we used the function "omega" of the R package psych (version 1.5.1; Revelle, 2014).

Yet, Reise, Scheines, et al. (2013) emphasized the limitations of ECV benchmarks by pointing out that the severity of structural parameter bias is context dependent. Even a small degree of parameter bias can distort relations in complex structural equation models with many paths. Thus, the higher the ECV, the better it is when unidimensional measurement models are used.

2.2.3.3 Global Model Fit Indices and Residual Correlations

The R package lavaan (version 0.5-18; Rosseel, 2012) was used to fit a one-factor confirmatory factor analysis model to every NARQ and NPI subscale. Consistent with basing the analysis on the tetrachoric/polychoric correlations, the weighted least squares mean and variance adjusted (WLSMV) estimator was applied. For the model of each subscale, three global model fit indices were computed: the CFI (Hu & Bentler, 1999), the RMSEA (Browne & Cudeck, 1993), and the SRMR (Bentler, 1995; Hu & Bentler, 1999). We use the benchmarks for adequate fit proposed by Hu and Bentler (1999): CFI = .95; RMSEA = .06, and SRMR = .08.

Furthermore, we counted the number of residual correlations (i.e., differences between the observed and model implied correlations) above |.20| for the one factor model of each subscale. Morizot et al. (2009) suggested that residual correlations above |.20| can be interpreted as signs for multidimensionality. Inspecting the residual correlations is usually seen as a test of the pairwise local independence assumption (i.e., two items are independent of each other conditional on the latent variable). However, many authors argue that unidimensionality is defined through local independence

(Hambleton, Swaminathan, & Rogers, 1991; McDonald, 2000) or unidimensionality implies local dependence (Birnbaum, 1968). Thus, we inspected the residual correlations as another way to assess CU.

2.2.3.4 Measurement Precision

In order to estimate the information curves of the NPI and NARQ subscales, we fitted the two-parameter logistic model (Birnbaum, 1968) to each NPI subscale (i.e., a separate model for each subscale) and the graded response model (Samejima, 1969) to each NARQ subscale using the R package mirt (version 1.9; Chalmers, 2012; for details on how to estimate the information curves see Embretson & Reise, 2000). The two-parameter logistic model is a logistic model for dichotomous items, and the graded response model is a generalization of the two-parameter logistic model to ordered-polytomously scored items (e.g., Embretson & Reise, 2000; Koch, 1983; Samejima, 1969). Assumptions of the two-parameter logistic model and graded response model include unidimensionality and local independence. The unidimensionality and local independence assumptions were tested in the course of the CU investigations. Furthermore, we used the R package mirt version 1.9 to obtain the S-X^2 item fit statistics (Orlando & Thissen, 2000; Kang & Chen, 2011). To assess the size of the misfit, we transformed the S-X^2 into Z values (Kenny, 2015) and the Z values into the effect size r (Rosenthal & DiMatteo, 2001; for details, see Chapter 2.6: Tables 2.8 to 2.20).

2.3 Results

2.3.1 Are the NARQ Subscales Higher in Closeness to Unidimensionality Than the NPI Subscales?

For each study sample, Table 2.1 shows the results of the minimum rank factor analysis (i.e, ECV, common variance, and error variance) of each NPI and NARQ subscale. Table 2.1 additionally depicts, for each subscale, the three fit indices and the number of residual correlations above |.20| under the one-factor confirmatory factor analysis model.

All ECVs were higher than 50%, indicating that the first factor of each NPI and NARQ subscale explained most of the common variance of its subscale in all samples. Furthermore, the subscales almost always met the Reise, Scheines, et al. (2013) 60% benchmark—the one exception will be described below—, which suggests that the parameter bias in structural equation modelling will often

be negligible. However, there were also differences among the subscales with regard to the ECVs, the fit indices, and the residual correlations. In the following, we first compare the CU of the NPI forced-choice version (Sample 1 and 2) to the CU of the NARQ (Sample 1 and 2) and afterwards the CU of the NPI Likert-scale version (Sample 3) to the CU of the NARQ (Sample 1 and 2).

Table 2.1
Closeness to Unidimensionality of various NPI and NARQ Facets

	NPI			NARQ	
	L/A	GE[a]	E/E	ADM	RIV
Number of items	11	9	4	9	9
Sample 1: GERMAN - NPI forced-choice vs. NARQ 6-point Likert					
ECV	**63**	**65**	**88**	**79**	**71**
CV	65	59	30	61	69
EV	35	41	70	39	31
CFI	.949	.954	.999	.987	.952
RMSEA	.071	.064	.010	.083	.150
SRMR	.092	.079	.016	.046	.092
resid r's > |.2|	3	1	0	0	1
Sample 2: ENGLISH - NPI forced-choice vs. NARQ 6-point Likert					
ECV	**65**	**55**	**74**	**71**	**66**
CV	70	71	31	51	64
EV	30	29	69	49	36
CFI	.985	.937	1.000	.986	.948
RMSEA	.045	.074	.000	.061	.147
SRMR	.065	.092	.024	.044	.098
resid r's > |.2|	0	1	0	0	3
Sample 3: ENGLISH - NPI 5-point Likert					
ECV	**73**	**66**	**91**		
CV	58	52	28		
EV	42	48	72		
CFI	.982	.948	.997		
RMSEA	.085	.116	.023		
SRMR	.050	.070	.010		
resid r's > |.2|	1	0	0		

Note. All analyses were based on tetrachoric/polychoric correlations. The ECVs of the subscales are boldfaced as these are the main results. Information about which residual inter-item correlations were above |.2| can be found in Chapter 2.6: Figures 2.8 to 2.20. ECV = Percentage of Explained Common Variance by first factor (minimum rank factor analysis); CV = Percentage of Common Variance (minimum rank factor analysis); EV = Percentage of Error or Item-Specific Variance (minimum rank factor analysis); CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; resid r's > |.2| = number of residual inter-item correlations above |.2|; NPI = Narcissistic Personality Inventory; L/A = Leadership/Authority; GE = Grandiose Exhibitionism; E/E = Entitlement/Exploitativeness; NARQ = Narcissistic Admiration and Rivalry Questionnaire; ADM = Narcissistic Admiration; RIV = Narcissistic Rivalry.

[a] Item 30 was excluded from the NPI Grandiose Exhibitionism subscale because the item content of Item 30 overlaps considerably with the content of NPI Item 7, and the overlap caused item misfit, model misfit, correlated residuals, and inflated information curves (see Chapter 2.6: Tables 2.4 to 2.7).

2.3.1.1 NPI with Forced-Choice Response Format Versus NARQ

We expected the NPI subscales to show lower levels of CU than the NARQ subscales. This expectation was partly supported by the data when the NPI was administered with its traditional forced-

choice response format (Sample 1 and Sample 2). In line with our expectation, NPI Leadership/Authority and NPI Grandiose Exhibitionism showed lower levels of CU than the two NARQ subscales (Table 2.1). Although the ECVs of Leadership/Authority (63% and 65%) and Grandiose Exhibitionism in the German sample (65%) were still fair, the ECV for Grandiose Exhibitionism in the English sample (55%) did not meet the 60% ECV benchmark, and its percentage of contaminated correlations was higher than 20% (i.e., 27%) in this sample. This suggests the presence of non-negligible parameter bias in structural equation models when unidimensionality is imposed for the forced-choice items of the English NPI Grandiose Exhibitionism subscale (Reise, Scheines, et al., 2013). The low levels of CU of the Grandiose Exhibitionism data also indicate that the interpretation of its scale scores and the associations thereof are somewhat ambiguous, because it is unclear to what extent the scale score or associations are driven by the first dimension or another dimension.

In contrast to our expectation, NPI Entitlement/Exploitativeness showed higher ECVs (88% and 74%) than Narcissistic Admiration (79% and 71%) and Narcissistic Rivalry (71% and 66%). Moreover, better fit indices and the lower number of residual correlations (Table 2.1) indicated that the Entitlement/Exploitativeness data were higher in CU than the data of the NARQ subscales. However, these differences need to be interpreted with caution as the number of items is different between NPI Entitlement/Exploitativeness and the NARQ subscales (four vs. nine) and a higher number of items almost surely entails a higher number of dimensions (Shapiro, 1982; see also Ten Berge & Sočan, 2004 and Chapter 2.6: Table 2.3). Thus, the difference in number of items might have partly caused the relatively higher CU of the NPI Entitlement/Exploitativeness data.

2.3.1.2 NPI with Likert Scale Response Format Versus NARQ

When we compared the NPI Likert scale version to the NARQ, our expectation that the NARQ outperforms the NPI with regard to CU was not confirmed. The ECV of NPI Leadership/Authority (73%) was similar to the ECVs of Narcissistic Admiration (79% and 71%) and slightly better than the ECVs of Narcissistic Rivalry (71% and 66%). The ECV of NPI Grandiose Exhibitionism (66%) was similar to the ECVs of NARQ Rivalry but lower than the ECV of NARQ Admiration. The ECV of the NPI Entitlement/Exploitativeness subscale (91%) was excellent and higher than the ECVs of the NARQ subscales (Table 2.1).

As a side note, the degree of common variance was very low for the NPI Entitlement/Exploitativeness subscale—around 30% common variance and thus around 70% error or item specific variance (Table 2.1)—even when compared to NPI subscales with similar length (Chapter

2.6: Table 2.3). This indicates that the response behavior to the four Entitlement/Exploitativeness items is not only determined by the common latent traits of Entitlement/Exploitativeness but also by random error and/or uncommon latent traits (i.e., traits that are only measured by one of the four Entitlement/Exploitativeness items). Therefore, Entitlement/Exploitativeness is probably measured with a low degree of MP—a question that will be addressed below.

2.3.2 Are the NARQ Subscales Higher in Measurement Precision Than the NPI Subscales?

Before we plotted the test information curves for each NARQ and NPI subscale, we assessed how well the responses to each item were described by the 2-PLM and graded response model, respectively. The IRT models fit well for most items in Sample 1 and Sample 2. In the largest sample, Sample 3, many items showed significant misfit (Chapter 2.6: Tables 2.8 to 2.20). That said, after excluding NPI Item 30 (see Method section), none of the items showed large misfit ($r > .20$).

The amount of information delivered by the subscales of the NPI and NARQ are depicted in Figure 2.1. A higher amount of information indicates a higher degree of MP. We superimposed grey lines that indicate a reliability of .60, .70, .80, and .90, assuming a standard normally distributed theta in the population. In the latent trait range where these lines are exceeded by the information curve, the precision of the test score is comparable to that obtained using a test for which the reliability is above .60, .70, .80, and .90, respectively.

We superimposed the information curves of the same subscale from different samples onto each other (Figure 2.1). Furthermore, the information curves of different subscales are comparable because the mean and variance of the latent trait of each subscale are fixed to zero and one, respectively. That said, the various NPI and NARQ subscales do not measure the same latent traits (for correlations among traits and their nomological networks, see Chapter 2.6: Table 2.21). Thus, it is not correct to say that any subscale measures the same latent trait with more MP than any other subscale. Rather, the interpretation is that one subscale measures its latent trait with more MP, say, one standard deviation above the mean than the other subscales measures its latent trait one standard deviation above the mean.

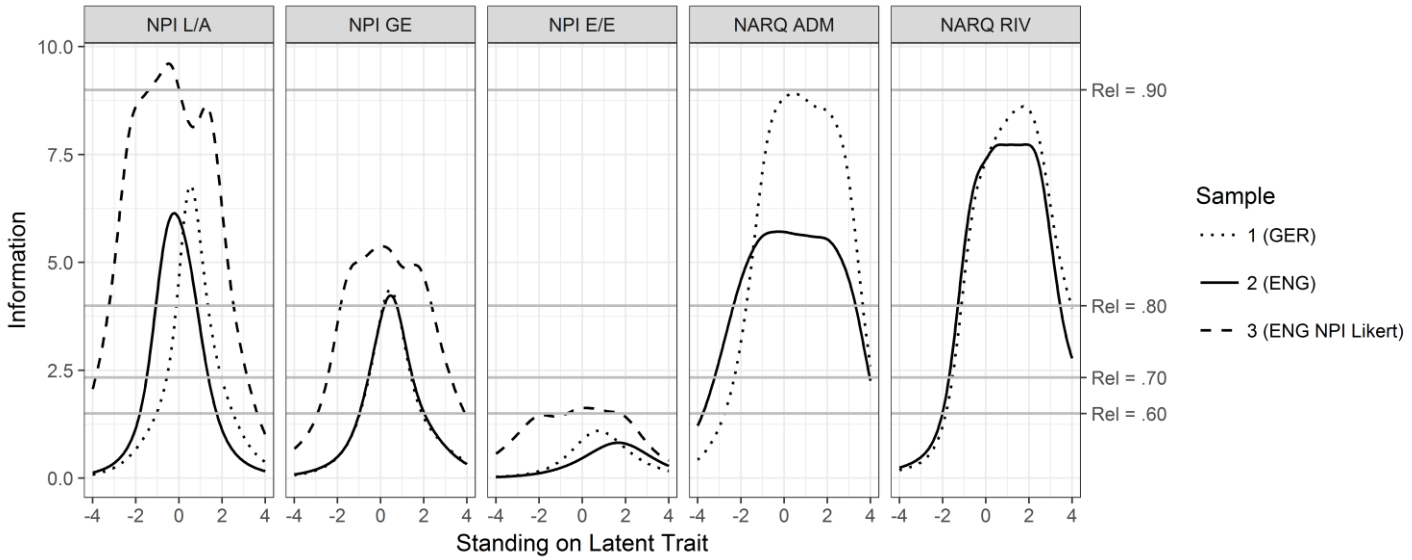

Figure 2.1. Test information as a function of standing on the latent trait for the NPI and NARQ subscales. The superimposed grey lines represent a reliability level of .60, .70, .80, and .90. The reliability can be derived from the information by the following formulas Rel = Var(θ) / (Var(θ) + Var(ε))
The R package mirt automatically fixes the population variance of the latent variable to 1 to identify the model. Plus, the error variance Var(ε) is equal to 1/*I(θ)* (Samejima, 1994). Thus,
Rel = 1 / (1 + 1/*I(θ)*)
where Rel is the total-score reliability. GER = German version; ENG = English version; Likert = 5-Point Likert scale response format; NPI = Narcissistic Personality Inventory; L/A = Leadership/Authority; GE = Grandiose Exhibitionism; E/E = Entitlement/Exploitativeness; NARQ = Narcissistic Admiration and Rivalry Questionnaire; ADM = Narcissistic Admiration; RIV = Narcissistic Rivalry.

2.3.3 NPI with forced-choice response format versus NARQ

We expected that the NPI would measure its latent traits with less MP than the NARQ. In line with this expectation, two subscales of the forced-choice NPI, Leadership/Authority and Grandiose Exhibitionism, measured their respective dimension with relative high MP (reliability ≥ .80) in a narrower theta range (i.e., depending on the subscale and data somewhere between -1 to +1) than NARQ Admiration and Rivalry (-2 to +3 and -1 to +4, respectively; Figure 2.1). In other words, narcissistic admiration and rivalry were—in contrast to the two NPI facets—not only measured with high MP among people with an average degree of admiration and rivalry but also among people with an above (and below) average degree of admiration and rivalry, respectively. The third NPI subscale, Entitlement/Exploitativeness, showed relatively low MP (reliability < .60) across the whole latent trait continuum in the two forced-choice samples and thus was clearly inferior to the NARQ subscales (Figure 2.1). The NPI forced-choice results were similar to previous MP results for the three NPI

subscale data (Ackerman et al., 2012), but the degree of MP of Entitlement/Exploitativeness was a bit lower in the current study than found by Ackerman et al. (2012). Yet, the levels of MP of Entitlement/Exploitativeness reported by Ackerman et al. (2012) were still distinctly lower than the levels of MP of NARQ Admiration and Rivalry that we found (Figure 2.1). Taken together, in line with our expectations, the subscales of the NARQ showed more desirable MP properties than the subscales of the NPI using its original forced-choice response format.

2.3.4 NPI with Likert scale response format versus NARQ

When the NPI was administered using the 5-point Likert scale response format, the latent trait range that was measured with high MP was similarly wide for NPI Leadership/Authority and NPI Grandiose Exhibitionism as for NARQ Admiration and Rivalry (Figure 2.1: dashed lines). NPI Leadership/Authority and NARQ Admiration were measured with high MP across a particularly broad theta range, -3 to +2.5 and -2.5 to +3, respectively. Also, the information curve of NPI Leadership/Authority climbed similarly high in the average latent trait range as the curves of the two NARQ subscales in the German sample (Sample 1) and higher than the curve of NARQ Admiration in the English sample (Sample 2).

The MP of NPI Entitlement/Exploitativeness was lower than the MP of the two NARQ subscales even when the NPI was administered with a Likert scale response format (Figure 2.1: dashed lines). The information curve for Entitlement/Exploitativeness did not reach or come close to the .80 reliability line at any range of the latent trait continuum. It is worth noting that the NPI Entitlement/Exploitativeness subscale has fewer items than the two NARQ subscales. This is certainly a handicap for MP because the test information function is the sum of the item information functions. In order to control for the impact of test length on the MP results, we compared the average information per item of the Entitlement/Exploitativeness subscale to the average information per item of the two NARQ subscales: We divided the test information of the subscales by their number of items—for completeness we did so for all five NPI and NARQ subscales (Figure 2.2). Although the difference between Entitlement/Exploitativeness and the two NARQ subscales was somewhat smaller in this comparison than in the whole scale comparison (Figure 2.1), the MP of Entitlement/Exploitativeness was smaller than the MP of the two NARQ subscales almost across the whole latent trait continuum. Furthermore, other short NPI subscales, such as the Vanity subscale which was proposed by Raskin and Terry (1988) and Ackerman et al. (2016), showed a higher MP and percentage of common variance (Chapter 2.6: Figures 2.3 and 2.5, Table 2.3) than

Entitlement/Exploitativeness (Figure 2.1, Table 2.1). These results indicate that the low MP of Entitlement/Exploitativeness is not only due to the low number of items but also due to the low percentage of common variance among Entitlement/Exploitativeness items (Table 2.1).

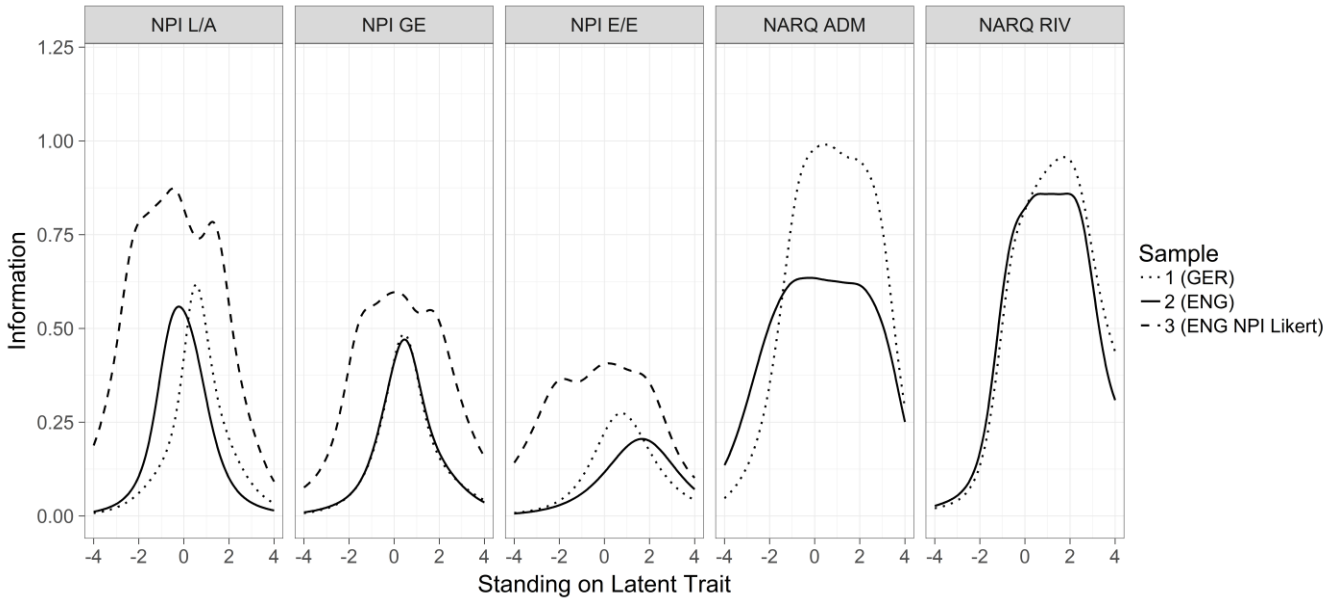

Figure 2.2. Average amount of information delivered per item as a function of standing on the latent trait for the NPI and NARQ subscales. The average amount of information was calculated by dividing the test information function by the number of items. GER = German version; ENG = English version; Likert = 5-Point Likert scale response format; NPI = Narcissistic Personality Inventory; L/A = Leadership/Authority; GE = Grandiose Exhibitionism; E/E = Entitlement/Exploitativeness; NARQ = Narcissistic Admiration and Rivalry Questionnaire; ADM = Narcissistic Admiration; RIV = Narcissistic Rivalry.

2.4 Discussion

The results partly corroborate our conjecture that the disregard of the multidimensional nature of grandiose narcissism during NPI creation has led to a lower CU and MP of the data of NPI subscales. In line with our expectations, NPI Grandiose/Exhibitionism did not match the NARQ subscales—at least not Narcissistic Admiration—with regard to CU. Further, NPI Entitlement/Exploitativeness did not match the NARQ subscales with regard to MP, even when the NPI was administered with a Likert-scale response format. However, in contrast to our expectations, the Likert-scale data of NPI Leadership/Authority were at least as high in CU and MP as the two NARQ subscales (Table 2.1, Figure 2.1). The lack of a theory that distinguishes various aspects of narcissism and the strive for unidimensionality of the NPI total scale seems to have led to an overemphasis on Leadership/Authority and an underrepresentation or distorted assessment of other

aspects of narcissism in the NPI (see also Back et al., 2013; Pincus et al., 2009). This lack of emphasis is especially marked with regard to NPI Entitlement/Exploitativeness, as reflected in its short test length (four items), its low degree of common variance (Table 2.1), and its relatively low MP compared to other short NPI subscales (e.g., Vanity; Ackerman et al., 2016; Raskin & Terry, 1998; Chapter 2.6: Figures 2.3 to 2.5). That the focus of the NPI is primarily on Leadership/Authority rather than on Entitlement/Exploitativeness is unfortunate for researchers interested in clinically relevant features of narcissism. Entitlement/Exploitativeness is the NPI subscale most strongly linked to maladaptive outcomes (e.g., Ackerman et al., 2011), and Leadership/Authority has often been linked to adaptive traits and outcomes (e.g., Ackerman et al., 2011; Stanton et al., 2016).

The subscale of the NARQ that is most strongly associated to maladaptive outcomes, Narcissistic Rivalry (e.g., Back et al., 2013; Wurst et al., in press), measures its trait more precisely in the medium and high latent trait range than NPI Entitlement/Exploitativeness. This indicates that the Rivalry scale comes with less attenuation of effect sizes and lower sample size requirements to test an effect with enough power than the NPI Entitlement/Exploitativeness scale (see also Wolf et al., 2013). Furthermore, the high MP is directly related to lower standard errors (e.g., Embretson, 1996). Low standard errors in the high latent trait area would be a desirable feature if the Rivalry scale were to be applied in clinical settings (e.g., as a screening instrument). There is still room for improvement in the low latent trait area of the Rivalry scale though. Furthermore, the CU of Rivalry was lower than the CU of other NPI and NARQ subscales (Table 2.1). Future research might substitute existing Rivalry items with items (1) that assess rivalry with high MP in the low latent trait range and (2) that increase the CU of the scale.

Interestingly, the data of all three NPI subscales showed higher CU and MP when the NPI items were administered with a 5-point Likert scale response format than when administered with the traditional forced-choice response format (for an overview see Table 2.2). This finding confirms our expectation that the differences in MP between the data of the NPI forced-choice subscales and the data of the NARQ subscales are at least partly due to differences in response format. Having five response options (5-point Likert scale) compared to having two response options (pairwise forced-choice) seems to induce a broader range of high MP. The latter observation is in line with the assertion that every additional response category can add information (Koch, 1983; Samejima, 1969).

Table 2.2
Overview and Evaluation of Results

	NPI			NARQ	
	L/A	GE[a]	E/E	ADM	RIV
Closeness to Unidimensionality					
Forced-choice	fair	fair / poor	very good / good	-	-
Likert	good	fair	excellent	good	good / fair
Measurement Precision					
Forced-choice	good	fair	very poor	-	-
Likert	very good	very good	fair	very good	very good

Note. Please note the evaluations only refer to two psychometric properties of the subscales, closeness to unidimensionality and measurement precision. When you select a narcissism subscale you want to take into account other psychometric properties as well, especially the validity of the subscales (for research on the validity see e.g., Back et al., 2013; Gentile, Miller, Carter, Hoffman, & Campbell, 2016; Miller et al., 2014). To evaluate the measurement precision, we calculated the marginal reliabilities for latent traits from a normal (Gaussian) distribution using the marginal_rxx function of the R package mirt (version 1.9; Chalmers, 2012; for R code see https://osf.io/mzj7p/). We classified as 'excellent' (ECV > 90%; marginal reliability > .90), 'very good' (ECV = 80-90%; marginal reliability = .80-.90), 'good' (ECV = 70-80%; marginal reliability = .70-.80), 'fair' (ECV = 60-70%; marginal reliability = .60-.70), "poor' (ECV = 50-60%; marginal reliability = .50-.60), and 'very poor' (ECV < 50%; marginal reliability < .50; for detailed results see Table 2.1 and Figure 2.1). NPI = Narcissistic Personality Inventory; L/A = Leadership/Authority; GE = Grandiose Exhibitionism; E/E = Entitlement/Exploitativeness; NARQ Narcissistic Admiration and Rivalry Questionnaire; ADM = Narcissistic Admiration; RIV = Narcissistic Rivalry.

[a] Item 30 was excluded from the NPI Grandiose Exhibitionism subscale because the item content of Item 30 overlaps considerably with the content of NPI Item 7, and the overlap caused item misfit, model misfit, correlated residuals, and inflated information curves (see Chapter 2.6: Tables 2.4 to 2.7).

Surprisingly, the response format also influenced the CU of the NPI subscales. In the traditional forced-choice version of the NPI, each item comprised of both narcissistic and non-narcissistic statements, and participants are asked to select the statement with which they identify most. One issue of the traditional format is that the "narcissistic" and "non-narcissistic" statements of the same item sometimes tap different dimensions (Ackerman et al., 2016; Wetzel et al., 2016). Hence, some forced-choice NPI items elicits individual differences with regard to more than one dimension, which reduces the CU, as the current results indicate. In the Likert scale version of the NPI, respondents are asked how much they agree with each of the two forced-choice statements in isolation. Thus, in the Likert scale version, the reduction of CU can be avoided through analyzing exclusively responses to narcissistic statements, as was done in the current study. Therefore, from a CU and MP perspective, the NPI 5-point Likert version and the NARQ with its 6-point Likert scale are preferable over the original NPI forced-choice version.

2.4.1 Limitations and Future Research

A limitation of our comparison is that the Likert scale of the NPI and the Likert scale of the NARQ had a different number of response options, five and six, respectively. Recently, Boldero et al. (2015) found that the NPI administered with a binary response format (disagree vs. agree) yields slightly different results than the NPI with a 6-point Likert scale ("strongly disagree" to "strongly agree"). Potentially, respondents react differently to a 5-point Likert response format than to a 6-point Likert response format. For example, the presence or absence of a mid-point answer category might influence response behavior. Future research needs to probe into this issue.

Another limitation of the current study is that only two narcissism instruments were investigated regarding CU and MP. In recent years, an array of narcissism instruments have been developed, for example the Five Factor Narcissism Inventory (Glover, Miller, Lynam, Crego, & Widiger, 2012) or the Pathological Narcissism Inventory (Pincus et al., 2009). Although some of these instruments are not intended to measure grandiose narcissism or normal narcissism, future research might want to investigate to what extent these other instruments overlap with the NPI and NARQ and—if so—to what extent they are viable alternatives to the NPI and NARQ regarding CU and MP.

Finally, the current study does not investigate whether the dominant latent trait measured by the respective subscale is the latent trait of interest (construct validity) and how the latent trait is related to behaviors or other relevant outcomes (criterion validity). Both construct and criterion validity are—however–also crucial features of a scale which researchers need to take into account when choosing a narcissism scale (for research that investigates and discusses the construct and criterion validity of the forced-choice and Likert version of the NPI and the NARQ see Back et al., 2013; Gentile, Miller, Carter, Hoffman, & Campbell, 2016; Miller et al., 2014).

2.4.2 Conclusion and Recommendations

Taken together, with regard to CU and MP, the subscales of the NARQ (Admiration and Rivalry) mostly outperformed the subscales of the NPI (Leadership/Authority, Grandiose Exhibitionism, and Entitlement/Exploitativeness) when the NPI was administered with its traditional pairwise forced-choice format but not when the NPI was administered with a 5-point Likert response format. Thus, from a CU and MP perspective, we recommend using the two NARQ subscales and/or NPI Leadership/Authority and Grandiose Exhibitionism with a Likert scale response format rather than the NPI with a forced-choice response format to measure the various aspects of grandiose narcissism. The NPI Entitlement/Exploitativeness scale showed substantial weaknesses with regard to MP and low percentages of common variance regardless of the response format. Thus, it should, in its current form,

not be applied. Future psychometric research on the NPI and NARQ subscales should try to improve the CU of NPI Grandiose Exhibitionism and NARQ Rivalry and the MP of NPI Entitlement/Exploitativeness.

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2.6 Supplemental Material

Table 2.3

Closeness to Unidimensionality of Various NPI Facets

	Ackerman et al. (2015)					Corry et al. (2008)		Raskin and Terry (1988)						
	Man	Exh	Lead	Van	Sup	L/A	Ex/En	Auth	Exh	Sup	Ent	Expl	S-S	Van
Number of items	5	3	6	3	4	9	14	8	7	5	6	5	6	3
GERMAN - NPI forced-choice (Sample 1)														
ECV	**82**	**100**	**81**	**100**	**90**	**66**	**46**	**71**	**64**	**68**	**73**	**72**	**54**	**100**
CV	46	60	65	67	48	72	61	69	60	55	41	48	45	67
EV	54	40	35	33	52	28	39	31	40	45	59	52	55	33
CFI	.973	1.000	.982	1.000	.997	.959	.872	.965	.974	.914	.978	.937	.896	1.000
RMSEA	.054	.000	.068	.000	.027	.078	.086	.078	.067	.105	.028	.074	.051	.000
SRMR	.045	.000	.056	.000	.027	.095	.110	.082	.074	.099	.039	.060	.059	.000
resid r's > |.2|	0	0	0	0	0	2	10	1	2	1	0	0	0	0
ENGLISH - NPI forced-choice (Sample 2)														
ECV	**81**	**100**	**79**	**100**	**83**	**68**	**43**	**71**	**62**	**68**	**71**	**76**	**61**	**100**
CV	43	63	68	64	54	76	66	76	62	65	35	47	29	64
EV	57	37	32	36	46	24	34	24	38	35	65	53	71	36
CFI	.997	1.000	.995	1.000	.992	.989	.903	.990	.987	.858	.975	.983	.929	1.000
RMSEA	.017	.000	.038	.000	.053	.046	.079	.047	.051	.168	.027	.041	.031	.000
SRMR	.035	.000	.041	.000	.049	.062	.110	.058	.073	.129	.047	.049	.048	.000
resid r's > |.2|	0	0	0	0	0	0	14	0	0	3	0	0	0	0
ENGLISH - NPI 5-point Likert (Sample 3)														
ECV	**94**	**100**	**89**	**100**	**89**	**81**	**55**	**84**	**77**	**87**	**84**	**88**	**76**	**100**
CV	47	68	58	63	68	59	53	58	50	41	30	45	33	63
EV	53	32	42	37	32	41	47	42	50	59	70	55	67	37
CFI	.999	1.000	.997	1.000	.985	.992	.936	.992	.996	.994	.989	.996	.978	1.000
RMSEA	.027	.000	.053	.000	.195	.067	.132	.072	.063	.052	.034	.042	.046	.000
SRMR	.013	.000	.026	.000	.048	.037	.087	.038	.037	.026	.020	.020	.027	.000
resid r's >	0	0	0	0	0	0	6	0	0	0	0	0	0	0

|.2|

Note. All analysis are based on tetrachoric/polychoric correlations. The ECVs of the subscales are boldfaced as these are the main results. ECV = Percentage of Explained Common Variance by first factor (minimum rank factor analysis); CV = Percentage of Common Variance (minimum rank factor analysis); EV = Percentage of Error or Item-Specific Variance (minimum rank factor analysis); CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; resid r's > |.2| = number of residual inter-item correlations above |.2|. For Ackerman et al. (2015; for 5-point Likert scale version of NPI) facets: Man = Manipulativeness; Exh = Exhibitionism; Lead = Leadership; Van = Vanity; Sup = Superiority. For Corry et al. (2008) facets: L/A = Leadership/Authority; Ex/En = Exhibitionism/Entitlement. For Raskin & Terry (1988) facets: Auth = Authority; Exh = Exhibitionism; Sup = Superiority; Ent = Entitlement; Expl = Exploitativeness; S-S = Self-Sufficiency; Van = Vanity.

Table 2.4

Closeness to Unidimensionality of the NPI Grandiose Exhibitionism Subscale with and without NPI Item 7 or NPI Item 30

	Sample 1 (German)			Sample 2 (English)			Sample 3 (English Likert)		
	Full	w/o Item 7	w/o Item 30	Full	w/o Item 7	w/o Item 30	Full	w/o Item 7	w/o Item 30
Number of items	10	9	9	10	9	9	10	9	9
ECV	**59**	**63**	**65**	**52**	**55**	**55**	**64**	**65**	**66**
CV	68	60	59	76	71	71	58	53	52
EV	32	40	41	24	29	29	42	47	48
CFI	.923	.958	.954	.906	.932	.937	.946	.948	.948
RMSEA	.099	.060	.064	.116	.078	.074	.170	.118	.116
SRMR	.104	.075	.079	.127	.095	.092	.100	.071	.070
resid r's > |.2|	6	2	1	9	1	1	6	0	0

Note. All analysis are based on tetrachoric/polychoric correlations. The ECVs of the subscales are boldfaced as these are the main results. ECV = Percentage of Explained Common Variance by first factor (minimum rank factor analysis); CV = Percentage of Common Variance (minimum rank factor analysis); EV = Percentage of Error or Item-Specific Variance (minimum rank factor analysis); CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; resid r's > |.2| = number of residual inter-item correlations above |.2|.

Table 2.5

Residual Inter-Item Correlations, Standardized Factor Loadings and S-X^2 item fit statistics for full Grandiose Exhibitionism subscale (Sample 1)

	npi4	npi7	npi15	npi19	npi20	npi26	npi28	npi29	npi30	npi38	loading	*S-X²*	*df*	*p*	*r*
npi4						.28					.52	8.11	7	.323	.01
npi7				-.34				-.26			.86	31.43	6	≤ .001	**.10**
npi15											.72	4.61	7	.707	-.01
npi19		-.34						.22	-.32		.74	5.72	7	.572	-.01
npi20											.33	8.73	7	.273	.01
npi26	.28										.55	4.83	6	.566	.00
npi28										.21	.40	8.68	7	.277	.01
npi29		-.26		.22							.67	3.32	6	.768	-.02
npi30				-.32							.83	9.89	6	.13	**.03**
npi38							.21				.49	5.74	7	.571	.00

Note. The table displays the residual inter-item correlations above |.20| and the standardized factor loadings after fitting a one factor confirmatory factor analysis model to the subscale data, applying the WLSMV estimator. The columns on the right indicate the S-X^2 item fit statistics for the fitted IRT models (Orlando & Thissen, 2000; Kang & Chen, 2011). We transformed the S-X^2 into *Z* values by the following formula from http://davidakenny.net/cm/fit.htm:

$Z = \sqrt{(2\chi^2)} - \sqrt{(2df - 1)}$

Afterwards, we transformed the *Z* values into the effect size *r* by the following formula from Rosenthal & DiMatteo (2001)

$r = Z/\sqrt{(N)}$.

Whenever *S-X²* is below the expected value of the χ^2 distribution (i.e., *df*), the *r* is negative. The rs for the items with content overlap, Item 7 and Item 30, are in bold. loading = standardized factor loading.

Table 2.6

Residual Inter-Item Correlations, Standardized Factor Loadings and S-X^2 item fit statistics for full Grandiose Exhibitionism subscale (Sample 2)

	npi4	npi7	npi15	npi19	npi20	npi26	npi28	npi29	npi30	npi38	loading	*S-X²*	*df*	*p*	*r*
npi4						.44					.57	15.34	7	.032	.07
npi7			-.26	-.32				-.24			.87	21.05	6	.002	**.12**
npi15		-.26		.23					-.27		.68	5.95	6	.429	.01
npi19		-.32	.23					.22	-.36		.68	5.23	6	.515	.00
npi20											.48	5.02	7	.658	-.02
npi26	.44										.55	9.86	6	.131	.04
npi28											.31	8.61	7	.282	.02
npi29		-.24		.22					-.27		.65	7.38	6	.288	.02
npi30			-.27	-.36				-.27			.87	16.73	6	.01	**.09**
npi38											.50	10.91	7	.143	.04

Note. The table displays the residual inter-item correlations above |.20| and the standardized factor loadings after fitting a one factor confirmatory factor analysis model to the subscale data, applying the WLSMV estimator. The columns on the right indicate the S-X^2 item fit statistics for the fitted IRT models (Orlando & Thissen, 2000; Kang & Chen, 2011). We transformed the S-X^2 into *Z* values by the following formula from http://davidakenny.net/cm/fit.htm:
$Z = \sqrt{(2\chi^2)} - \sqrt{(2df - 1)}$
Afterwards, we transformed the *Z* values into the effect size *r* by the following formula from Rosenthal & DiMatteo (2001)
$r = Z/\sqrt{(N)}$.
Whenever *S-X²* is below the expected value of the χ^2 distribution (i.e., *df*), the *r* is negative. The rs for the items with content overlap, Item 7 and Item 30, are in bold.
loading = standardized factor loading.

Table 2.7

Residual Inter-Item Correlations, Standardized Factor Loadings and S-X^2 item fit statistics for full Grandiose Exhibitionism subscale (Sample 3)

	npi4	npi7	npi15	npi19	npi20	npi26	npi28	npi29	npi30	npi38	loading	*S-X^2*	*df*	*p*	*r*
npi4											.26	185.01	110	≤ .001	.06
npi7			-.20	-.34				-.29			.89	601.71	66	≤ .001	**.32**
npi15		-.20							-.20		.62	259.79	101	≤ .001	.12
npi19		-.34							-.34		.72	283.49	103	≤ .001	.13
npi20											.55	134.15	93	.003	.04
npi26											.42	192.62	97	≤ .001	.08
npi28											.46	161.51	104	≤ .001	.05
npi29		-.29							-.28		.70	326.81	100	≤ .001	.16
npi30			-.20	-.34				-.28			.89	771.85	66	≤ .001	**.38**
npi38											.43	146.03	104	.004	.04

Note. The table displays the residual inter-item correlations above |.20| and the standardized factor loadings after fitting a one factor confirmatory factor analysis model to the subscale data, applying the WLSMV estimator. The columns on the right indicate the S-X^2 item fit statistics for the fitted IRT models (Orlando & Thissen, 2000; Kang & Chen, 2011). We transformed the S-X^2 into *Z* values by the following formula from http://davidakenny.net/cm/fit.htm:
$Z = \sqrt{(2\chi^2)} - \sqrt{(2df - 1)}$
Afterwards, we transformed the *Z* values into the effect size *r* by the following formula from Rosenthal & DiMatteo (2001)
$r = Z/\sqrt{(N)}$.
Whenever *S-X^2* is below the expected value of the χ^2 distribution (i.e., *df*), the *r* is negative. The rs for the items with content overlap, Item 7 and Item 30, are in bold.
loading = standardized factor loading.

Table 2.8

Residual Inter-Item Correlations, Standardized Factor Loadings and S-X^2 item fit statistics for NPI Leadership Authority (Sample 1)

	npi1	npi5	npi10	npi11	npi12	npi27	npi32	npi33	npi34	npi36	npi40	loading	S-X^2	*df*	*p*	*r*
npi1				.20								.61	7.73	6	.259	.01
npi5												.41	10.69	8	.22	.02
npi10												.88	11.72	6	.068	.03
npi11	.20					-.26						.62	20.82	7	.004	.06
npi12												.61	10.23	8	.249	.01
npi27				-.26								.66	3.53	7	.832	-.02
npi32												.83	11.41	7	.122	.03
npi33												.71	6.66	7	.465	.00
npi34											.28	.41	7.62	8	.471	.00
npi36												.67	10.69	8	.22	.02
npi40									.28			.37	16.91	8	.031	.04

Note. The table displays the residual inter-item correlations above |.20| and the standardized factor loadings after fitting a one factor confirmatory factor analysis model to the subscale data, applying the WLSMV estimator. The columns on the right indicate the S-X^2 item fit statistics for the fitted IRT models (Orlando & Thissen, 2000; Kang & Chen, 2011). We transformed the S-X^2 into *Z* values by the following formula from http://davidakenny.net/cm/fit.htm:
$Z = \sqrt{(2\chi^2)} - \sqrt{(2df - 1)}$
Afterwards, we transformed the *Z* values into the effect size *r* by the following formula from Rosenthal & DiMatteo (2001)
$r = Z/\sqrt{(N)}$.
Whenever *S-X²* is below the expected value of the χ^2 distribution (i.e., *df*), the *r* is negative. loading = standardized factor loading.

Table 2.9

Residual Inter-Item Correlations, Standardized Factor Loadings and S-X^2 item fit statistics for NPI Leadership Authority (Sample 2)

	npi1	npi5	npi10	npi11	npi12	npi27	npi32	npi33	npi34	npi36	npi40	loading	S-X^2	*df*	*p*	*r*
npi1												.62	6.53	7	.480	.00
npi5												.41	16.48	8	.036	.07
npi10												.86	4.24	6	.645	-.02
npi11												.60	6.40	8	.602	-.01
npi12												.76	5.25	8	.731	-.02
npi27												.58	6.51	8	.591	-.01
npi32												.8	8.76	7	.270	.02
npi33												.83	3.49	7	.836	-.04
npi34												.37	17.75	8	.023	.08
npi36												.76	9.31	7	.232	.03
npi40												.44	16.58	8	.035	.07

Note. The table displays the residual inter-item correlations above |.20| and the standardized factor loadings after fitting a one factor confirmatory factor analysis model to the subscale data, applying the WLSMV estimator. The columns on the right indicate the S-X^2 item fit statistics for the fitted IRT models (Orlando & Thissen, 2000; Kang & Chen, 2011). We transformed the S-X^2 into *Z* values by the following formula from http://davidakenny.net/cm/fit.htm:

$Z = \sqrt{(2\chi^2)} - \sqrt{(2df - 1)}$

Afterwards, we transformed the *Z* values into the effect size *r* by the following formula from Rosenthal & DiMatteo (2001)

$r = Z/\sqrt{(N)}$.

Whenever *S-X²* is below the expected value of the χ^2 distribution (i.e., *df*), the *r* is negative. loading = standardized factor loading.

Table 2.10

Residual Inter-Item Correlations, Standardized Factor Loadings and S-X^2 item fit statistics for NPI Leadership Authority (Sample 3)

	npi1	npi5	npi10	npi11	npi12	npi27	npi32	npi33	npi34	npi36	npi40	loading	S-X^2	*df*	*p*	*r*
npi1												.64	117.41	102	.141	.01
npi5												.39	194.05	123	0	.06
npi10												.83	89.46	79	.198	.01
npi11												.57	172.74	107	≤ .001	.06
npi12												.60	134.72	105	.027	.03
npi27												.60	128.47	107	.077	.02
npi32												.65	140.39	99	.004	.04
npi33												.77	138.30	91	.001	.04
npi34											.24	.55	178.04	114	≤ .001	.05
npi36												.82	113.85	82	.012	.03
npi40									.24			.59	116.14	111	.35	.01

Note. The table displays the residual inter-item correlations above |.20| and the standardized factor loadings after fitting a one factor confirmatory factor analysis model to the subscale data, applying the WLSMV estimator. The columns on the right indicate the S-X^2 item fit statistics for the fitted IRT models (Orlando & Thissen, 2000; Kang & Chen, 2011). We transformed the S-X^2 into *Z* values by the following formula from http://davidakenny.net/cm/fit.htm:
$Z = \sqrt{(2\chi^2)} - \sqrt{(2df - 1)}$
Afterwards, we transformed the *Z* values into the effect size *r* by the following formula from Rosenthal & DiMatteo (2001)
$r = Z/\sqrt{(N)}$.
Whenever *S-X*^{2} is below the expected value of the χ^2 distribution (i.e., *df*), the *r* is negative. loading = standardized factor loading.

Table 2.11

Residual Inter-Item Correlations, Standardized Factor Loadings and S-X^2 item fit statistics for NPI Grandiose Exhibitionism without Item 30 (Sample 1)

	npi4	npi7	npi15	npi19	npi20	npi26	npi28	npi29	npi38	loading	S_X2	df	p	r
npi4						.26				.54	5.87	6	.438	.00
npi7										.57	14.68	6	.023	.05
npi15										.78	9.62	5	.087	.03
npi19										.83	24.18	5	.000	.09
npi20										.32	5.76	6	.451	.00
npi26	.26									.55	3.44	5	.633	-.01
npi28										.43	12.50	6	.052	.04
npi29										.74	12.64	5	.027	.05
npi38										.51	9.74	6	.136	.02

Note. The table displays the residual inter-item correlations above |.20| and the standardized factor loadings after fitting a one factor confirmatory factor analysis model to the subscale data, applying the WLSMV estimator. The columns on the right indicate the S-X^2 item fit statistics for the fitted IRT models (Orlando & Thissen, 2000; Kang & Chen, 2011). We transformed the S-X^2 into *Z* values by the following formula from http://davidakenny.net/cm/fit.htm:
$Z = \sqrt{(2\chi^2)} - \sqrt{(2df - 1)}$
Afterwards, we transformed the *Z* values into the effect size *r* by the following formula from Rosenthal & DiMatteo (2001)
$r = Z/\sqrt{(N)}$.
Whenever *S-X^2* is below the expected value of the χ^2 distribution (i.e., *df*), the *r* is negative. loading = standardized factor loading.

Table 2.12

Residual Inter-Item Correlations, Standardized Factor Loadings and S-X^2 item fit statistics for NPI Grandiose Exhibitionism without Item 30 (Sample 2)

	npi4	npi7	npi15	npi19	npi20	npi26	npi28	npi29	npi38	loading	S_X2	df	p	r
npi4						.42				.60	6.75	6	.345	.01
npi7										.51	10.86	6	.093	.05
npi15										.77	5.53	5	.355	.01
npi19										.79	11.28	5	.046	.07
npi20										.49	2.82	6	.831	-.04
npi26	.42									.56	4.17	5	.526	.00
npi28										.33	5.74	6	.453	.00
npi29										.75	7.16	4	.128	.04
npi38										.53	16.13	6	.013	.09

Note. The table displays the residual inter-item correlations above |.20| and the standardized factor loadings after fitting a one factor confirmatory factor analysis model to the subscale data, applying the WLSMV estimator. The columns on the right indicate the S-X^2 item fit statistics for the fitted IRT models (Orlando & Thissen, 2000; Kang & Chen, 2011). We transformed the S-X^2 into *Z* values by the following formula from http://davidakenny.net/cm/fit.htm:

$Z = \sqrt{(2\chi^2)} - \sqrt{(2df - 1)}$

Afterwards, we transformed the *Z* values into the effect size *r* by the following formula from Rosenthal & DiMatteo (2001)

$r = Z/\sqrt{(N)}$.

Whenever *S-X^2* is below the expected value of the χ^2 distribution (i.e., *df*), the *r* is negative. loading = standardized factor loading.

Table 2.13

Residual Inter-Item Correlations, Standardized Factor Loadings and S-X^2 item fit statistics for NPI Grandiose Exhibitionism without Item 30 (Sample 3)

	npi4	npi7	npi15	npi19	npi20	npi26	npi28	npi29	npi38	loading	S_X2	df	p	r
npi4										.28	171.45	97	.000	.06
npi7										.60	178.24	87	.000	.08
npi15										.69	177.40	75	.000	.09
npi19										.80	295.34	72	.000	.17
npi20										.53	137.10	89	.001	.04
npi26										.42	192.47	86	.000	.09
npi28										.48	193.96	89	.000	.09
npi29										.78	209.10	72	.000	.12
npi38										.43	133.52	92	.003	.04

Note. The table displays the residual inter-item correlations above |.20| and the standardized factor loadings after fitting a one factor confirmatory factor analysis model to the subscale data, applying the WLSMV estimator. The columns on the right indicate the S-X^2 item fit statistics for the fitted IRT models (Orlando & Thissen, 2000; Kang & Chen, 2011). We transformed the S-X^2 into *Z* values by the following formula from http://davidakenny.net/cm/fit.htm:
$Z = \sqrt{(2\chi^2)} - \sqrt{(2df - 1)}$
Afterwards, we transformed the *Z* values into the effect size *r* by the following formula from Rosenthal & DiMatteo (2001)
$r = Z/\sqrt{(N)}$.
Whenever *S-X^2* is below the expected value of the χ^2 distribution (i.e., *df*), the *r* is negative. loading = standardized factor loading.

Table 2.14

Residual Inter-Item Correlations, Standardized Factor Loadings and S-X^2 item fit statistics for NPI Entitlement/Exploitativeness (Sample 1)

	npi13	npi14	npi24	npi25	loading	*S-X²*	*df*	*p*	*r*
npi13					.36	0.24	1	.623	-.01
npi14					.39	1.49	1	.223	.02
npi24					.58	4.24	1	.039	.04
npi25					.66	0.76	1	.382	.01

Note. The table displays the residual inter-item correlations above |.20| and the standardized factor loadings after fitting a one factor confirmatory factor analysis model to the subscale data, applying the WLSMV estimator. The columns on the right indicate the S-X^2 item fit statistics for the fitted IRT models (Orlando & Thissen, 2000; Kang & Chen, 2011). We transformed the S-X^2 into *Z* values by the following formula from http://davidakenny.net/cm/fit.htm:
$Z = \sqrt{(2\chi^2)} - \sqrt{(2df - 1)}$
Afterwards, we transformed the *Z* values into the effect size *r* by the following formula from Rosenthal & DiMatteo (2001)
$r = Z/\sqrt{(N)}$.
Whenever *S-X²* is below the expected value of the χ^2 distribution (i.e., *df*), the *r* is negative. loading = standardized factor loading.

Table 2.15

Residual Inter-Item Correlations, Standardized Factor Loadings and S-X^2 item fit statistics for NPI Entitlement/Exploitativeness (Sample 2)

	npi13	npi14	npi24	npi25	loading	*S-X²*	*df*	*p*	*r*
npi13					.35	0.18	1	.668	-.01
npi14					.41	1.83	1	.177	.03
npi24					.54	2.22	1	.136	.04
npi25					.51	0.18	1	.674	-.02

Note. The table displays the residual inter-item correlations above |.20| and the standardized factor loadings after fitting a one factor confirmatory factor analysis model to the subscale data, applying the WLSMV estimator. The columns on the right indicate the S-X^2 item fit statistics for the fitted IRT models (Orlando & Thissen, 2000; Kang & Chen, 2011). We transformed the S-X^2 into *Z* values by the following formula from http://davidakenny.net/cm/fit.htm:
$Z = \sqrt{(2\chi^2)} - \sqrt{(2df - 1)}$
Afterwards, we transformed the *Z* values into the effect size *r* by the following formula from Rosenthal & DiMatteo (2001)
$r = Z/\sqrt{(N)}$.
Whenever *S-X²* is below the expected value of the χ^2 distribution (i.e., *df*), the *r* is negative. loading = standardized factor loading.

Table 2.16

Residual Inter-Item Correlations, Standardized Factor Loadings and S-X^2 item fit statistics for NPI Entitlement/Exploitativeness (Sample 3)

	npi13	npi14	npi24	npi25	loading	*S-X²*	*df*	*p*	*r*
npi13					.32	134.56	29	≤ .001	.12
npi14					.55	95.23	28	≤ .001	.09
npi24					.34	87.89	29	≤ .001	.08
npi25					.70	74.55	27	≤ .001	.07

Note. The table displays the residual inter-item correlations above |.20| and the standardized factor loadings after fitting a one factor confirmatory factor analysis model to the subscale data, applying the WLSMV estimator. The columns on the right indicate the S-X^2 item fit statistics for the fitted IRT models (Orlando & Thissen, 2000; Kang & Chen, 2011). We transformed the S-X^2 into *Z* values by the following formula from http://davidakenny.net/cm/fit.htm:
$Z = \sqrt{(2\chi^2)} - \sqrt{(2df - 1)}$
Afterwards, we transformed the *Z* values into the effect size *r* by the following formula from Rosenthal & DiMatteo (2001)
$r = Z/\sqrt{(N)}$.
Whenever *S-X²* is below the expected value of the χ^2 distribution (i.e., *df*), the *r* is negative. loading = standardized factor loading.

Table 2.17

Residual Inter-Item Correlations, Standardized Factor Loadings and S-X^2 item fit statistics for NARQ Narcissistic Admiration (Sample 1)

	narq1	narq2	narq3	narq5	narq7	narq8	narq15	narq16	narq18	loading	*S-X²*	*df*	*p*	*r*
narq1										.69	125.98	114	.209	.02
narq2										.66	131.05	115	.145	.02
narq3										.73	114.03	103	.215	.02
narq5										.55	130.61	120	.239	.02
narq7										.67	127.32	121	.329	.01
narq8										.77	121.33	96	.041	.04
narq15										.74	129.52	111	.11	.03
narq16										.77	84.10	100	.873	-.03
narq18										.60	99.17	120	.917	-.03

Note. The table displays the residual inter-item correlations above |.20| and the standardized factor loadings after fitting a one factor confirmatory factor analysis model to the subscale data, applying the WLSMV estimator. The columns on the right indicate the S-X^2 item fit statistics for the fitted IRT models (Orlando & Thissen, 2000; Kang & Chen, 2011). We transformed the S-X^2 into *Z* values by the following formula from http://davidakenny.net/cm/fit.htm:
$Z = \sqrt{(2\chi^2)} - \sqrt{(2df - 1)}$
Afterwards, we transformed the *Z* values into the effect size *r* by the following formula from Rosenthal & DiMatteo (2001)
$r = Z/\sqrt{(N)}$.
Whenever *S-X²* is below the expected value of the χ^2 distribution (i.e., *df*), the *r* is negative. loading = standardized factor loading.

Table 2.18

Residual Inter-Item Correlations, Standardized Factor Loadings and S-X^2 item fit statistics for NARQ Narcissistic Admiration (Sample 2)

	narq1	narq2	narq3	narq5	narq7	narq8	narq15	narq16	narq18	loading	*S-X²*	*df*	*p*	*r*
narq1										.66	77.79	76.63	.443	.01
narq2										.57	91.47	80.13	.183	.03
narq3										.69	56.49	68.73	.853	-.04
narq5										.44	102.30	77.53	.032	.07
narq7										.59	74.84	80.10	.644	-.01
narq8										.62	99.28	81.40	.088	.05
narq15										.68	83.95	79.83	.356	.01
narq16										.76	68.88	56.63	.129	.04
narq18										.35	92.12	87.23	.341	.02

Note. The table displays the residual inter-item correlations above |.20| and the standardized factor loadings after fitting a one factor confirmatory factor analysis model to the subscale data, applying the WLSMV estimator. The columns on the right indicate the S-X^2 item fit statistics for the fitted IRT models (Orlando & Thissen, 2000; Kang & Chen, 2011). We transformed the S-X^2 into *Z* values by the following formula from http://davidakenny.net/cm/fit.htm:
$Z = \sqrt{(2\chi^2)} - \sqrt{(2df - 1)}$
Afterwards, we transformed the *Z* values into the effect size *r* by the following formula from Rosenthal & DiMatteo (2001)
$r = Z/\sqrt{(N)}$.
Whenever *S-X²* is below the expected value of the χ^2 distribution (i.e., *df*), the *r* is negative. loading = standardized factor loading.

Table 2.19

Residual Item-Pair Correlations, Standardized Factor Loadings and S-X^2 item fit statistics for NARQ Narcissistic Rivalry (Sample 1)

	narq4	narq6	narq9	narq10	narq11	narq12	narq13	narq14	narq17	loading	*S-X²*	*df*	*p*	*r*
narq4						.21				.70	125.90	88	.005	.06
narq6										.76	89.72	89	.459	.00
narq9										.79	81.02	91	.764	-.02
narq10										.76	78.24	92	.846	-.02
narq11										.41	116.77	112	.36	.01
narq12	.21									.66	103.86	91	.168	.02
narq13										.71	112.19	115	.557	.00
narq14										.74	60.09	51	.18	.02
narq17										.78	96.35	89	.279	.01

Note. The table displays the residual inter-item correlations above |.20| and the standardized factor loadings after fitting a one factor confirmatory factor analysis model to the subscale data, applying the WLSMV estimator. The columns on the right indicate the S-X^2 item fit statistics for the fitted IRT models (Orlando & Thissen, 2000; Kang & Chen, 2011). We transformed the S-X^2 into *Z* values by the following formula from http://davidakenny.net/cm/fit.htm:
$Z = \sqrt{(2\chi^2)} - \sqrt{(2df - 1)}$
Afterwards, we transformed the *Z* values into the effect size *r* by the following formula from Rosenthal & DiMatteo (2001)
$r = Z/\sqrt{(N)}$.
Whenever *S-X²* is below the expected value of the χ^2 distribution (i.e., *df*), the *r* is negative. loading = standardized factor loading.

Table 2.20

Residual Item-Pair Correlations, Standardized Factor Loadings and S-X^2 item fit statistics for NARQ Narcissistic Rivalry (Sample 2)

	narq4	narq6	narq9	narq10	narq11	narq12	narq13	narq14	narq17	loading	*S-X²*	*df*	*p*	*r*
narq4										.61	58.66	65.00	.693	-.02
narq6										.83	75.61	54.37	.036	.07
narq9										.83	53.69	54.90	.522	.00
narq10										.74	49.44	52.60	.598	-.01
narq11										.48	79.73	78.37	.437	.01
narq12										.62	48.79	52.37	.614	-.01
narq13								.22	.24	.55	64.52	70.83	.687	-.02
narq14							.22		.24	.47	50.47	41.53	.165	.04
narq17							.24	.24		.62	58.63	52.37	.263	.02

Note. The table displays the residual inter-item correlations above |.20| and the standardized factor loadings after fitting a one factor confirmatory factor analysis model to the subscale data, applying the WLSMV estimator. The columns on the right indicate the S-X^2 item fit statistics for the fitted IRT models (Orlando & Thissen, 2000; Kang & Chen, 2011). We transformed the S-X^2 into *Z* values by the following formula from http://davidakenny.net/cm/fit.htm:
$Z = \sqrt{(2\chi^2)} - \sqrt{(2df - 1)}$
Afterwards, we transformed the *Z* values into the effect size *r* by the following formula from Rosenthal & DiMatteo (2001)
$r = Z/\sqrt{(N)}$.
Whenever *S-X²* is below the expected value of the χ^2 distribution (i.e., *df*), the *r* is negative. loading = standardized factor loading.

Table 2.21

Correlations among Various Narcissistic Latent Traits

	NPI L/A	NPI GE[a]	NPI E/E	ADM	RIV
NPI L/A	1				
NPI GE[a]	.39 (.49)	1			
NPI E/E	.50 (.37)	.24 (.34)	1		
ADM	.60 (.59)	.52 (.54)	.45 (.30)	1	
RIV	.20 (.10)	.19 (.24)	.72 (.55)	.49 (.35)	1

Note. The displayed correlation coefficients are based on correlations between IRT based latent variable scores (Weighted Likelihood Estimator; Warm, 1989) disattenuated for unreliability. Coefficients outside the brackets are from the German sample (Sample 1; $N = 1856$). Coefficients inside the brackets are from the English Sample (Sample 2; $N = 666$). NPI = Narcissistic Personality Inventory; NARQ Narcissistic Admiration and Rivalry Questionnaire; L/A = Leadership/Authority; GE = Grandiose Exhibitionism; ADM = Narcissistic Admiration; RIV = Narcissistic Rivalry.

[a] Item 30 was excluded from the Grandiose Exhibitionism subscale proposed by Ackerman et al. (2011) because the item content of Item 30 overlaps considerably with the content of Item 7, and the overlap caused item misfit, model misfit, correlated residuals, and inflated information curves (see Chapter 2.6: Tables 2.4 to 2.7).

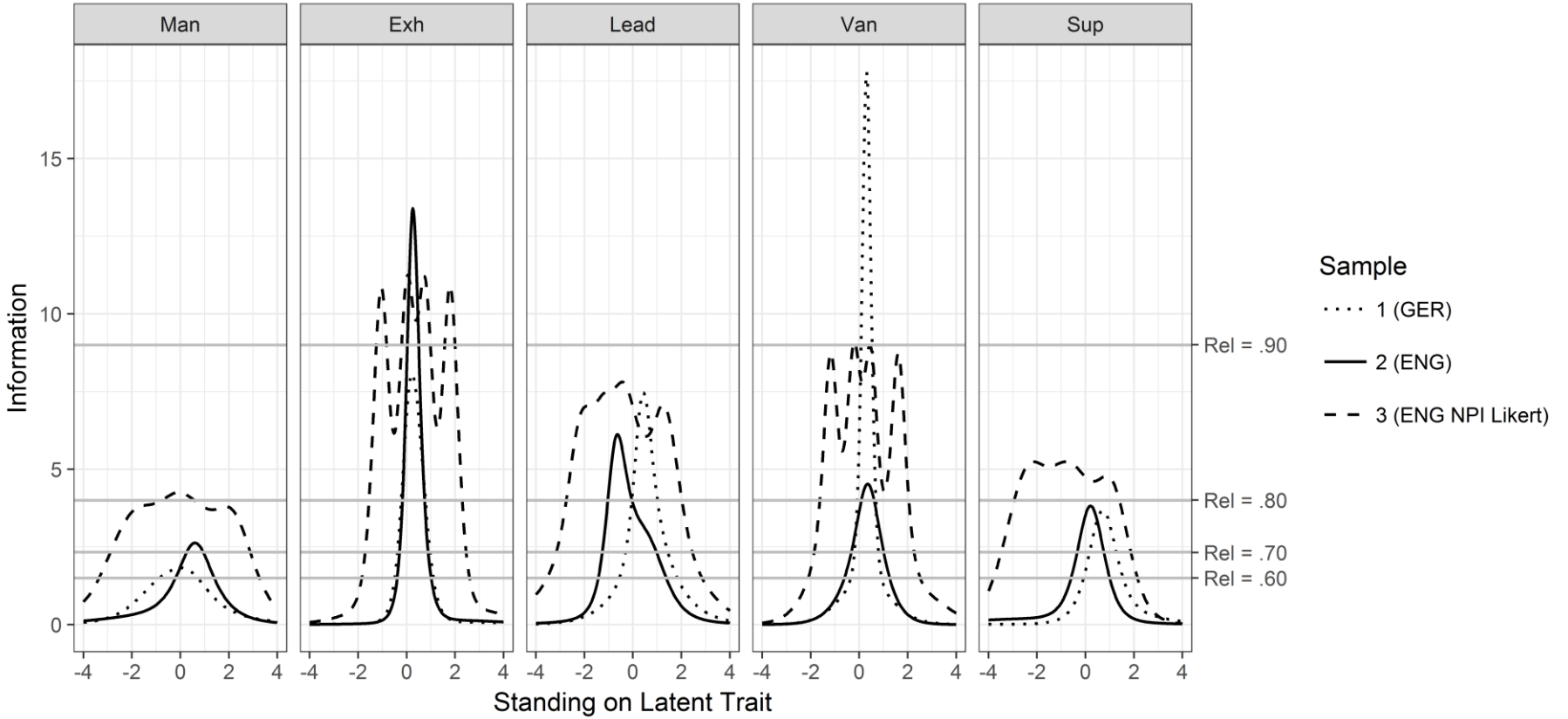

Figure 2.3. Test information of NPI subscales proposed by Ackerman et al. (2015) as a function of standing on the latent trait. The superimposed grey lines represent a reliability level of .60, .70, .80, and .90. The reliability can be derived from the information by the following formulas

Rel = Var(θ) / (Var(θ) + Var(ε))

The R package mirt automatically fixes the population variance of the latent variable to 1 to identify the model. Plus, the error variance Var(ε) is equal to $1/I(\theta)$ (Samejima, 1994). Thus,

Rel = $1 / (1 + 1/I(\theta))$

where Rel is the total-score reliability. Man = Manipulativeness; Exh = Exhibitionism; Lead = Leadership; Van = Vanity; Sup = Superiority.

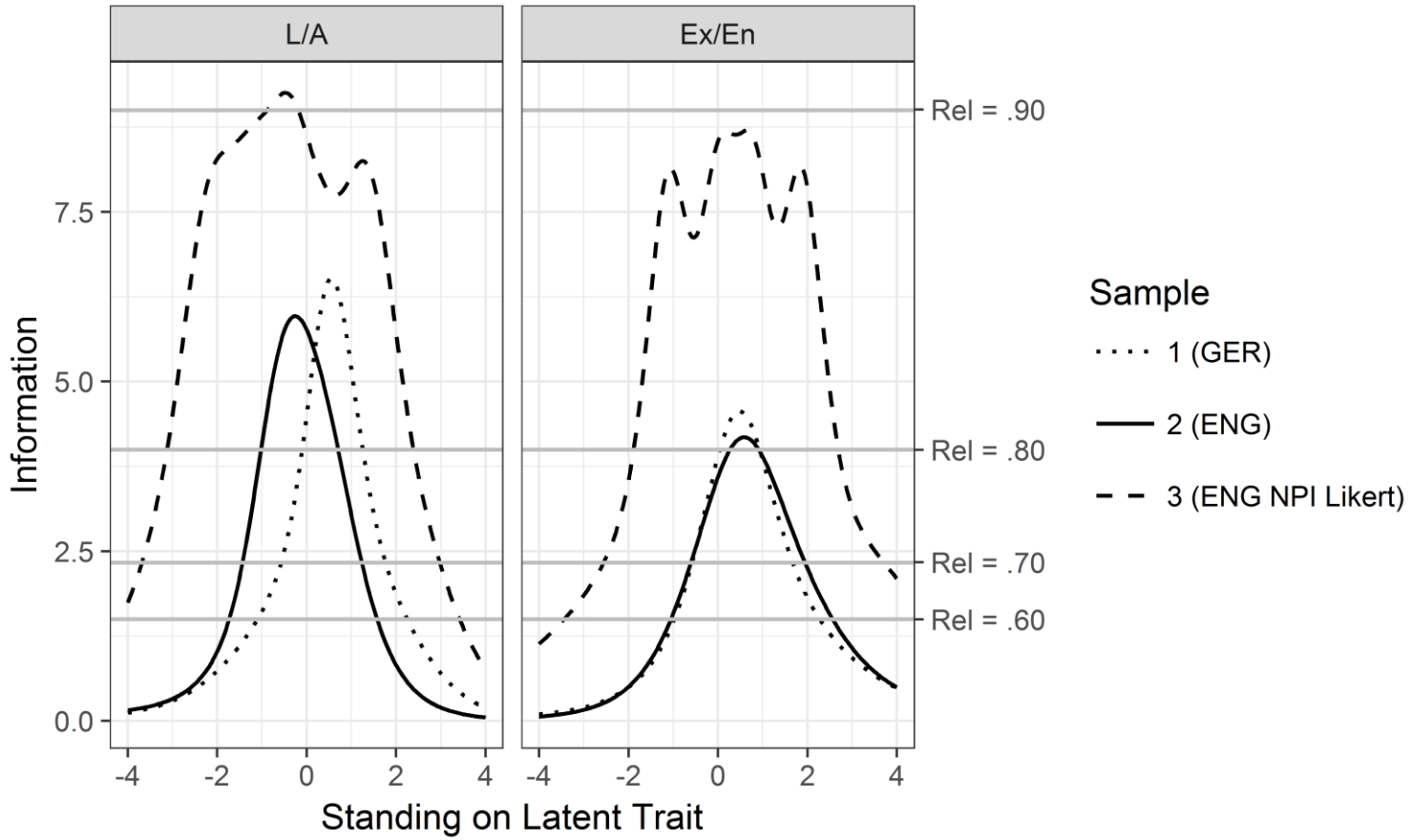

Figure 2.4. Test information of NPI subscales proposed by Corry et al. (2008) as a function of standing on the latent trait. The superimposed grey lines represent a reliability level of .60, .70, .80, and .90. The reliability can be derived from the information by the following formulas

Rel = Var(θ) / (Var(θ) + Var(ε))

The R package mirt automatically fixes the population variance of the latent variable to 1 to identify the model. Plus, the error variance Var(ε) is equal to $1/I(\theta)$ (Samejima, 1994). Thus,

Rel = $1 / (1 + 1/I(\theta))$

where Rel is the total-score reliability. L/A = Leadership/Authority; Ex/En = Exhibitionism/Entitlement.

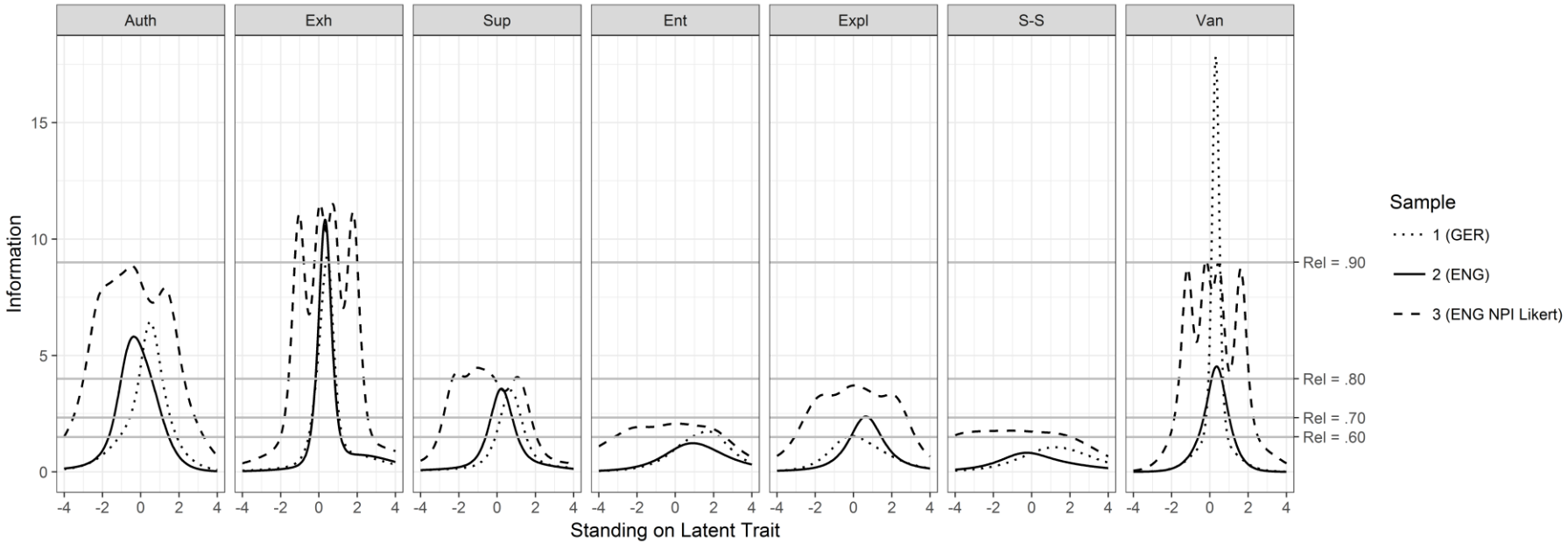

Figure 2.5. Test information of NPI subscales proposed by Raskin & Terry (1988) as a function of standing on the latent trait. The superimposed grey lines represent a reliability level of .60, .70, .80, and .90. The reliability can be derived from the information by the following formulas

$\text{Rel} = \text{Var}(\theta) / (\text{Var}(\theta) + \text{Var}(\varepsilon))$

The R package mirt automatically fixes the population variance of the latent variable to 1 to identify the model. Plus, the error variance Var(ε) is equal to $1/I(\theta)$ (Samejima, 1994). Thus,

$\text{Rel} = 1 / (1 + 1/I(\theta))$

where Rel is the total-score reliability. Auth = Authority; Exh = Exhibitionism; Sup = Superiority; Ent = Entitlement; Expl = Exploitativeness; S-S = Self-Sufficiency; Van = Vanity.

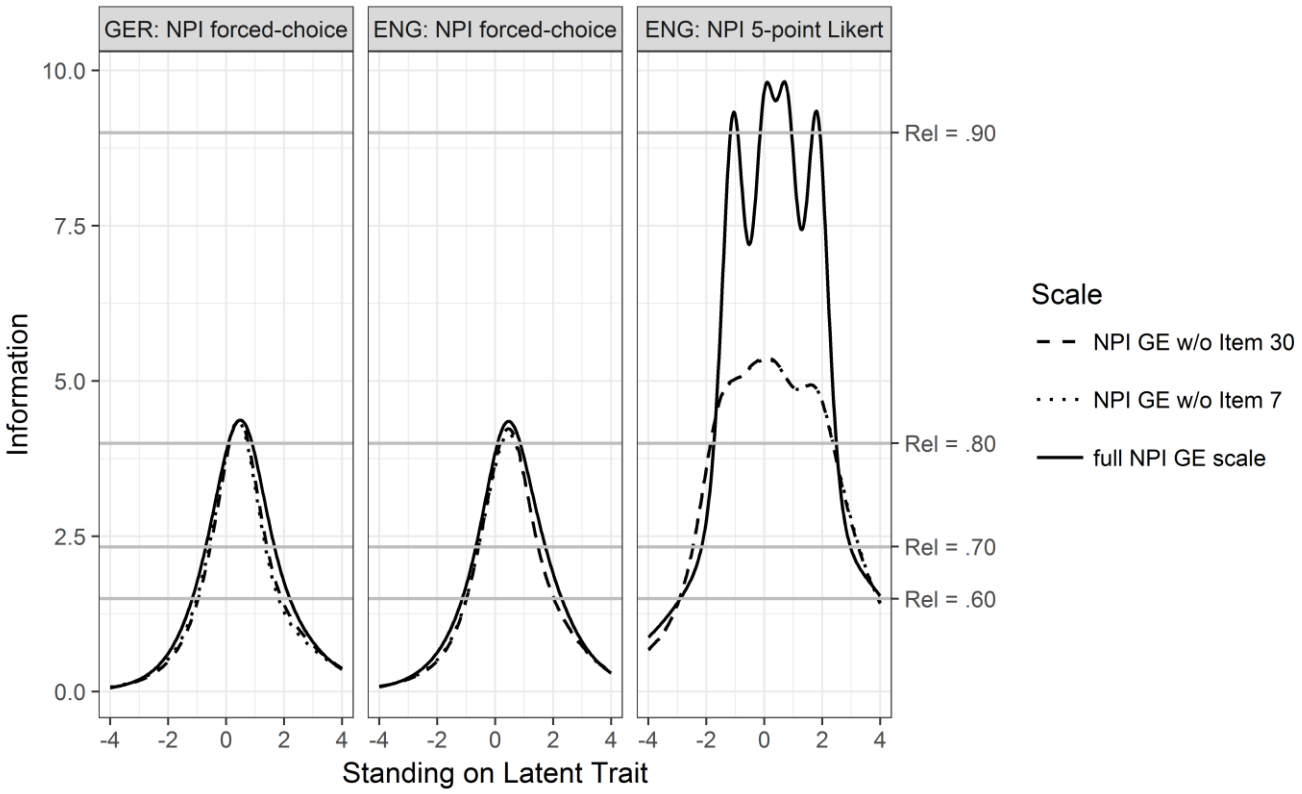

Figure 2.6. Test information as a function of standing on the latent trait for three versions of the NPI Grandiose Exhibitionisms scale across three different samples (Sample 1 to 3). The black line depicts the information curve for the full scale. The red line depicts the information curve for the scale without NPI Item 7 and the green line depicts the scale without NPI Item 30. The superimposed grey lines represent a reliability level of .60, .70, .80, and .90. The reliability can be derived from the information by the following formulas

$$Rel = Var(\theta) / (Var(\theta) + Var(\varepsilon))$$

The R package mirt automatically fixes the population variance of the latent variable to 1 to identify the model. Plus, the error variance $Var(\varepsilon)$ is equal to $1/I(\theta)$ (Samejima, 1994). Thus,

$$Rel = 1 / (1 + 1/I(\theta))$$

where Rel is the total-score reliability. NPI GE = Grandiose Exhibitionism facet of the Narcissistic Personality Inventory.

3

Study 2: A Dimension- and Content-Specific Approach to Investigate the Narcissism-Overclaiming Link

Grosz, M. P., Lösch, T., Back, M. D. (submitted). A Dimension- and Content-Specific Approach to Investigate the Narcissism-Overclaiming. *Journal of Research in Personality*.

Abstract

The present research investigated how different dimensions of narcissism (i.e., assertive, antagonistic, and vulnerable) and content-specific forms of assertive narcissism (i.e., intellectual ability, physical attractiveness, social dominance) are related to overclaiming bias (i.e., the tendency to illegitimately claim knowledge). The analysis of data from a large-scale online study (N = 1,682) confirmed our hypothesis: We found that assertive narcissism was more positively related to overclaiming bias than antagonistic and vulnerable narcissism were. Furthermore, and partly in line with our other hypotheses, intellectual-ability-specific and social-dominance-specific assertive narcissism were more positively related to overclaiming bias than physical-attractiveness-specific assertive narcissism was. Finally, multiple regression analyses suggested that the narcissism-overclaiming link is most robust for social-dominance-specific assertive narcissism.

Keywords: narcissism; overclaiming; self-enhancement; overconfidence; social dominance; intellectual ability

3. A Dimension- and Content-Specific Approach to Investigate the Narcissism-Overclaiming

3.1 Introduction

Overclaiming bias is the tendency to illegitimately claim knowledge. It is assessed with the Over-Claiming Questionnaire, which asks participants how familiar they are with specific concepts, persons, places, events, and so forth. Because some of the concepts, places, persons, and events do not exist and thus cannot be known, the answers to the questionnaire allow an assessment of overclaiming bias to be made. The Over-Claiming Questionnaire was introduced as an instrument for assessing self-enhancement more objectively than better-than-average ratings and more economically than criterion discrepancy measures (Paulhus, Harms, Bruce, & Lysy, 2003). Because self-enhancement is believed to be a central feature of narcissism, studies have repeatedly investigated the overclaiming-narcissism link, and most of them have found moderate positive associations between overclaiming bias and narcissism (e.g., Paulhus et al., 2003).

However, recent studies have questioned whether overclaiming bias is related to the narcissistic tendency to be disingenuous and self-centered: In a set of studies, Dunlop et al. (2017) found that overclaiming bias was predicted by openness and years of formal education but not by honesty-humility or narcissism (as measured by the Short Dark Triad). Ludeke and Makransky (2015) indicated that overclaiming bias is better predicted by careless responding than by self-deceptive enhancement scores or narcissism.

In order to clarify how overclaiming bias is linked to narcissism, we believe it is necessary to distinguish various (a) dimensions and (b) content-specific forms of narcissism. Unfortunately, previous research has almost exclusively used a single index to measure narcissism even though narcissism has been found to be multidimensional (e.g., Back et al., 2013a; Miller et al., 2011) and content-specific (Gebauer, Sedikides, Verplanken, & Maio, 2012).

In terms of dimensions, the current research distinguishes vulnerable and grandiose narcissism (e.g., Pincus et al., 2009) and splits up the latter into assertive and antagonistic narcissism (e.g., Back et al., 2013a). People high in vulnerable narcissism have grandiose fantasies, but—as opposed to people high in grandiose narcissism—they often suffer from

depressive mood and feelings of resentment and shame (e.g., Pincus et al., 2009). People high in assertive narcissism promote themselves in order to reach narcissistic goals such as status, superiority, and power. People high in antagonistic narcissism harm and devaluate others and engage in deliberate cheating rather than self-enhancement in order to reach narcissistic goals (e.g., Back et al., 2013a). This suggests that people high in antagonistic and vulnerable narcissism do not self-enhance and that they do not perceive their ego-driven standards and fantasies are met. In fact, both antagonistic and vulnerable narcissism have been found to be negatively correlated with self-esteem (e.g., Back et al., 2013a; Pincus et al., 2009) and thus might even be negatively related to overclaiming bias. Thus, we hypothesized that assertive narcissism would be more strongly positively correlated to overclaiming bias than antagonistic and vulnerable narcissism would be.

In terms of content-specificity, the current research distinguished intellectual-ability-specific assertive narcissism (NARQ_ADM_INT[4]), physical-attractiveness-specific assertive narcissism (NARQ_ADM_ATTR), and social-dominance-specific assertive narcissism (NARQ_ADM_DOM). We focused on the content-specific forms of only assertive narcissism because antagonistic and vulnerable narcissism should not be related to overclaiming bias. People high in NARQ_ADM_INT promote themselves with regard to intellectual ability: They believe they are extraordinarily intelligent. People high in NARQ_ADM_ATTR promote themselves with regard to their physical appearance: They believe they are extraordinarily physically attractive. People high in NARQ_ADM_DOM promote themselves with regard to social dominance: They see themselves as extraordinary authorities with extraordinary leadership qualities. NARQ_ADM_INT, in particular, should be related to overclaiming bias given that (a) "overclaiming is the tendency to claim knowledge about non-existent items" (Paulhus et al., 2003; p. 891) and (b) Paulhus et al.'s (2003) Over-Claiming Questionnaire contains mainly items from the intellectual ability sphere (e.g., fine arts, language, physical sciences). Thus, we hypothesized that NARQ_ADM_INT would be more strongly positively correlated to overclaiming bias than NARQ_ADM_ATTR, NARQ_ADM_DOM, or content-unspecific assertive narcissism would be.

[4] These abbreviations contain "NARQ-ADM" because the items used to measure these constructs are content-specific items inspired by the NARQ subscale Narcissistic Admiration (Back et al., 2013b).

3.1.1 The Present Study

To investigate the relations between the various dimensions and content-specific forms of narcissism and overclaiming bias, pre-existing data from a large German online study were analyzed (for details see Method Section: Analysis Plan). We included overclaiming accuracy and openness to experience in some analyses as control variables because previous studies have shown that these two variables can be related to overclaiming bias (e.g., Dunlop et al., 2017).

3.2 Method

3.2.1 Participants and Procedure

The sample consisted of 1,682 German Internet users (72% female; 1,343 complete responses) who filled out an online questionnaire that contained various measures of narcissism, the Over-Claiming Questionnaire, and various self-report instruments that were not relevant to the current study. All participants were sampled via diverse mailing lists and snowball sampling. Participants received personality feedback for their participation and were entered into a lottery as an incentive. The mean age was 27.27 (Range: 18-73).

3.2.1.1 Pre-registration

Before we conducted the analyses, we pre-registered the hypotheses and analysis plan at the Open Science Framework: https://osf.io/b6xfh. At the time of pre-registration, the data had already been collected, and parts of the data had been analyzed with regard to other research questions (e.g., Back et al., 2013a).

3.2.2 Measures

3.2.2.1 Overclaiming bias

Overclaiming bias was measured with a German version of the Over-Claiming Questionnaire-150 (OCQ-150; Erler, 2009): Participants were asked how familiar they were with 150 specific terms (person, concept, place, etc.; from 0 = *I have never heard of the term* to 4 = *I am very familiar with the term*). Thirty of the 150 terms referred to nonexistent foils. We applied signal detection theory to calculate the bias index (i.e., criterion location *c*), which

indicates how strong the sense of familiarity has to be for a person to endorse an item (Paulhus et al., 2003).

Three Over-Claiming Questionnaire responses were recoded as missing values because two persons chose the lowest answer category (i.e., *I have never heard of the term*) for every one of the 150 overclaiming items, and one person did so for the last 45 items.

3.2.2.2 Narcissism

Assertive, antagonistic, and vulnerable narcissism were assessed with various subscales from the NPI (Raskin & Hall, 1979), the Narcissistic Admiration and Rivalry Questionnaire (NARQ; Back et al., 2013a), and the Pathological Narcissism Inventory (PNI; Pincus et al., 2009; Wright, Lukowitsky, Pincus & Conroy, 2010; see Figure 2.1). The three kinds of content-specific assertive narcissism (NARQ_ADM_INT, NARQ_ADM_ATTR, and NARQ_ADM_DOM) were assessed with 15 items each (Back et al., 2013b; see Chapter 3.6: Table 3.2). Example items are "I am a genius," "I am a very attractive person," and "I am a leader," respectively.

3.2.2.3 Control variables

To assess overclaiming accuracy, we calculated the d' index from signal detection theory (Paulhus et al., 2003). The d' index indicates how well a person is able to discriminate between real and nonexistent Over-Claiming Questionnaire items. Openness was assessed with three items from the Big Five Inventory-15 (BFI-15; Schupp & Gerlitz, 2005).

3.2.3 Analysis Plan

First, we calculated a correlation matrix with overclaiming bias and the scale scores from the NPI, NARQ, and PNI subscales. The scale scores were based on the unweighted mean of the item scores. Next, we tested the hypotheses with structural equation modeling (SEM). All hypotheses were tested with one-tailed tests. Nonhypothesized relations were tested with two-tailed tests. These analyses were computed with the software Mplus (version 7.3; Muthén & Muthén, 2014) and the R package MplusAutomation (version 0.6-3; Hallquist & Wiley, 2014). Data and R Code are available at: https://osf.io/w2yq2.

To test the dimension-specific hypotheses, we tested whether assertive narcissism was more strongly correlated with overclaiming bias than antagonistic and vulnerable narcissism were, respectively. The three dimensions of narcissism were modeled as second-order factors

(Figure 3.1). In this analysis, we deviated from the pre-registered analysis plan in three ways due to inadequate model fit and computational issues (for results obtained by following the original analysis plan, see Chapter 3.6: Tables 3.3 and 3.4): (a) Instead of using individual items as indicators, we used the average item score from the NPI, NARQ, and PNI subscales—an approach sometimes called *internal consistency parceling*. (b) The PNI facet Entitlement Rage loaded not only on vulnerable narcissism but also on antagonistic narcissism. (c) The errors of NPI Leadership/Authority and NPI Entitlement/Exploitativeness were allowed to correlate (Figure 3.1). To additionally test the incremental contribution of each dimension, we computed multiple regressions with overclaiming bias as the dependent variable and the three dimensions as independent variables, both with and without overclaiming accuracy and openness as control variables.

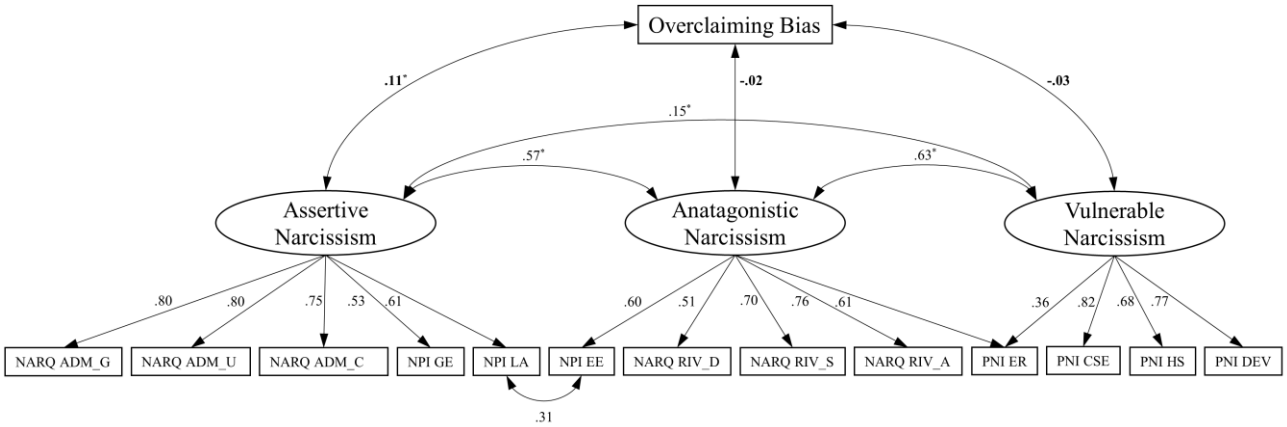

Figure 3.1. Second order factor model of various dimensions of narcissism and their relations to overclaiming bias. N = 1,682. Bidirectional arrows indicate latent correlations. The numbers next to the unidirectional arrows are standardized factor loadings. The fit indices for the model were: CFI = .912; RMSEA = .076. NARQ = Narcissistic Admiration and Rivalry Questionnaire; ADM_G = Grandiosity facet of Admiration; ADM_U = Uniqueness facet of Admiration; ADM_C = Charmingness facet of Admiration; RIV_D = Devaluation facet of Rivalry; RIV_S = facet of Rivalry Supremacy; RIV_A = Aggressiveness facet of NARQ Rivalry; NPI = Narcissistic Personality Inventory; LA = Leadership/Authority (Ackerman et al., 2011); GE = Grandiose Exhibitionism; EE = Entitlement/Exploitativeness; PNI = Pathological Narcissism Inventory; CSE = Contingent Self-Esteem; HS = Hiding the Self; DEV = Devaluation; ER = Entitlement Rage.
* $p \leq .001$.

To test the content-specific hypotheses, we tested whether NARQ_ADM_INT was more strongly correlated with overclaiming bias than NARQ_ADM_ATTR and NARQ_ADM_DOM were, respectively. In contrast to the three dimensions, the three content-specific forms of assertive narcissism were modeled without parceling and without a second-order structure: Each item loaded directly on one of the three latent variables. Because the univariate distributions of some ordinal items were skewed, we used the WLSMV estimator in this analysis (for results obtained with maximum likelihood estimation, see

Chapter 3.6: Tables 3.5 and 3.6). Again, we additionally conducted multiple regressions with overclaiming bias as the dependent variable and the three content-specific forms as independent variables, both with and without overclaiming accuracy and openness as control variables.

Finally, we tested whether NARQ_ADM_INT was more strongly correlated with overclaiming bias than content-unspecific assertive narcissism was. Both kinds of narcissism were measured as in the models above (for results obtained original analysis, see Chapter 3.6: Tables 3.7 and 3.8). We also computed multiple regressions with overclaiming bias as the dependent variable and the two kinds of narcissism as independent variables, both with and without overclaiming accuracy and openness as control variables.

3.3 Results

3.3.1 Manifest correlations

Table 3.1 shows the intercorrelations between overclaiming bias and all narcissism scales. In line with previous research, the correlation between the NPI total score and overclaiming bias was positive (r = .13, $p \leq .001$, 95% CI [.08, .18]), but the effect size was smaller than in most previous studies (e.g., Paulhus et al., 2003: r = .35; Gebauer et al., 2012: r = .20; but see also Ludeke & Makransky, 2016: r = .11). Out of the 16 narcissism scales, only five scales had correlations with overclaiming bias that were higher than .10 (i.e., the NPI total scale, NPI Leadership Authority, NARQ Charmingness, NARQ_ADM_INT, and NARQ_ADM_DOM). It is noteworthy that the three content-unspecific scales (i.e., NPI total scale, NPI Leadership Authority, and NARQ Charmingness) showed strong associations with NARQ_ADM_DOM (manifest rs = .71, .75, and .77, respectively), suggesting that these three scales largely overlap with NARQ_ADM_DOM.

Table 3.1

Intercorrelations Between Overclaiming Bias and Various Subscales From Narcissism Questionnaires

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. OC bias	.89																	
2. NPI total	.13	.84																
Assertive Narcissism Subscales																		
3. NPI LA	.15	.83	.75															
4. NPI GE	.06	.70	.36	.73														
5. NARQ ADM_G	.07	.60	.48	.42	.73													
6. NARQ ADM_U	.05	.53	.39	.42	.67	.71												
7. NARQ ADM_C	.15	.63	.56	.39	.56	.59	.76											
Antagonistic Narcissism Subscales																		
8. NPI EE	.03	.52	.37	.20	.24	.27	.31	.41										
9. NARQ RIV_D	.00	.27	.20	.07	.30	.25	.23	.37	.72									
10. NARQ RIV_S	-.04	.28	.17	.15	.28	.36	.25	.43	.48	.83								
11. NARQ RIV_A	-.02	.29	.17	.24	.29	.37	.27	.40	.35	.54	.65							
Vulnerable Narcissism Subscales																		
12. PNI CSE	-.07	-.02	-.13	.05	.06	.18	.05	.26	.16	.33	.47	.91						
13. PNI HS	-.02	.01	-.01	-.09	.02	.13	.08	.26	.23	.32	.31	.53	.82					
14. PNI DEV	.02	-.05	-.06	-.08	.06	.14	.05	.23	.23	.28	.36	.61	.60	.84				
15. PNI ER	-.01	.30	.17	.20	.32	.40	.30	.48	.34	.54	.67	.65	.46	.54	.87			
Content-Specific Assertive Narcissism Scales																		
16. NARQ_ADM_INT	.12	.55	.46	.28	.67	.66	.66	.37	.44	.41	.38	.17	.21	.21	.42	.94		
17. NARQ_ADM_ATTR	.06	.56	.32	.65	.55	.57	.53	.24	.22	.30	.33	.19	.07	.10	.34	.50	.94	
18. NARQ_ADM_DOM	.14	.71	.75	.37	.58	.61	.77	.40	.28	.38	.35	.06	.13	.09	.37	.65	.50	.94

Note. *N* varied from 1,343 to 1,682. Cronbach's alphas are displayed on the diagonal. The correlations are Pearson correlations between overclaiming bias and the scale scores, which were based on the unweighted mean of the item scores. OC bias = Overclaiming Bias; NPI = Narcissistic Personality Inventory; LA = Leadership/Authority (Ackerman et al., 2011); GE = Grandiose Exhibitionism; EE = Entitlement/Exploitativeness; NARQ = Narcissistic Admiration and Rivalry Questionnaire; ADM_G = Grandiosity facet of Narcissistic Admiration; ADM_U = Uniqueness facet of Narcissistic Admiration; ADM_C = Charmingness facet of Narcissistic Admiration; RIV_D = Devaluation facet of Narcissistic Rivalry; RIV_S = Supremacy facet of Narcissistic Rivalry; RIV_A = Aggressiveness facet of Narcissistic Rivalry; PNI = Pathological Narcissism Inventory; CSE = Contingent Self-Esteem; HS = Hiding the Self; DEV = Devaluation; ER = Entitlement Rage; NARQ_ADM_INT = Intellectual ability Specific Assertive Narcissism; NARQ_ADM_DOM = Social Dominance Specific Assertive Narcissism; NARQ_ADM_ATTR = Physical Attractiveness Specific Assertive Narcissism.

3.3.2 Dimension-specific results

We hypothesized that overclaiming bias would be more strongly related to assertive narcissism than to antagonistic and vulnerable narcissism. The SEM model showed an acceptable fit given the complexity of the model (CFI = .912; RMSEA = .076; Figure 3.1; Chapter 3.6: Table 3.3). In line with the hypotheses, overclaiming bias was more strongly correlated with assertive narcissism (r = .11, $p \leq .001$, 95% CI [.05, .18]) than it was with antagonistic narcissism (r = - .02, p = .64, 95% CI [-.08, .05]; for the difference in rs: t = 4.70, $p \leq .001$) or vulnerable narcissism (r = - .03, p = .37, 95% CI [-.09, .04]; for the difference in rs: t = 3.44, $p \leq .001$). The correlation between overclaiming bias and antagonistic narcissism did not differ from its correlation with vulnerable narcissism (t = 0.70, p = .48). In the multiple regressions, assertive narcissism was also more strongly associated to overclaiming bias than antagonistic and vulnerable narcissism were (Chapter 3.6: Table 3.4).

3.3.3 Content-specific results

We hypothesized that overclaiming bias would be more strongly correlated with NARQ_ADM_INT than it would be with NARQ_ADM_ATTR and NARQ_ADM_DOM. The SEM model showed an acceptable fit given that each content domain was assessed with 15 items (CFI = .905; RMSEA = .077). In favor of modeling the three content-specific sets of items as unidimensional scales, all 45 content-specific items loaded strongly on their respective latent variables (all standardized loadings: .64 to .88), and the reliabilities of the three scales were high (all three αs = .94). Confirming our hypothesis, overclaiming bias was more strongly correlated with NARQ_ADM_INT (r = .12, $p \leq .001$, 95% CI [.06, .17]) than with NARQ_ADM_ATTR (r = .06, p = .028, 95% CI [.01, .12]; for the difference in rs: t = 1.81, p = .035). Failing to support our hypothesis, overclaiming bias was *not* more strongly correlated with NARQ_ADM_INT than it was with NARQ_ADM_DOM (r = .14, $p \leq .001$, 95% CI [.09, .19]; for the difference in rs: t = -0.50, p = .69; Chapter 3.6: Table 3.5). It is interesting that overclaiming bias was more strongly correlated with NARQ_ADM_DOM than it was with NARQ_ADM_ATTR (for the difference in rs: t = 2.28, p = .023). In the multiple regressions, overclaiming bias was *not* more strongly associated with NARQ_ADM_INT than with NARQ_ADM_DOM or NARQ_ADM_ATTR; NARQ_ADM_DOM was again more strongly associated with overclaiming bias than NARQ_ADM_ATTR was (Chapter 3.6: Table 3.6).

3.3.4 Intellectual ability-specific assertive narcissism versus unspecific assertive narcissism

We furthermore hypothesized that overclaiming bias would be more strongly correlated with NARQ_ADM_INT than it would be with unspecific assertive narcissism. The model fit was poor[5] but acceptable given the complexity of the model (CFI = .904; RMSEA = .108). Failing to support our hypothesis, overclaiming bias was *not* more strongly correlated with NARQ_ADM_INT (r = .12, $p \leq .001$, 95% CI [.06, .17]) than it was with unspecific assertive narcissism (r = .13, $p \leq .001$, 95% CI [.07, .19]; for the difference in rs: t = -0.40, p = .65; Chapter 3.6: Table 3.7). The hypothesis was also not confirmed by the multiple regressions (Chapter 3.6: Table 3.8). Overclaiming bias was also *not* more strongly correlated with NARQ_ADM_DOM than it was with unspecific assertive narcissism; but these results need to be interpreted with caution given that the models fit poorly and contained strong correlations between NARQ_ADM_DOM and unspecific assertive narcissism (rs > .90; Chapter 3.6: Tables 3.9 and 3.10).

3.4 Discussion

In line with our hypotheses, overclaiming bias was related only to some dimensions and content-specific forms of narcissism. These findings buttress previous research that had argued that (a) it is important to differentiate between various dimensions of narcissism (e.g., Back et al., 2013a; Pincus et al., 2009) and (b) narcissism is content-specific (Gebauer et al., 2012). Future research on overclaiming bias and narcissism should more often distinguish between the various dimensions and content-specific forms of narcissism.

Not in line with our hypotheses, NARQ_ADM_DOM was an equally strong and more robust predictor of overclaiming bias than NARQ_ADM_INT. Similarly, the narcissism facets that had the strongest correlations with NARQ_ADM_DOM (e.g., NPI Leadership/Authority, NARQ Charmingness) were most strongly related to overclaiming bias (Table 3.1). Although this finding was unexpected because we thought overclaiming would be found to be a behavior that was specific to the intellectual ability sphere, the finding is in line with Anderson et al.'s (2012) research, which showed that people who overclaim achieve a

[5] The poor fit was probably due to unspecified cross-loadings given that NARQ_ADM_INT and unspecific assertive narcissism were highly correlated in the various SEM models: rs = .80 to .90 (see also Table 3.1).

higher social status in groups. Overclaiming bias seems to be a strategy that people high in NARQ_ADM_DOM use to achieve and maintain their social status and leadership positions in groups.

Furthermore, also not in line with our hypotheses, the content-specific forms of narcissism were not stronger predictors of overclaming bias than content-unspecific assertive narcissism was. This finding seems to be at odds with findings by Brunswik (1956), who pointed out that a predictor is stronger when it is on the same level of abstraction as the criterion. There are several reasons for this unexpected finding. First, perhaps overclaiming is a less domain-specific behavior than expected, given that the purpose of overclaiming might be to enhance one's status and not to bolster one's self-esteem in a specific domain. Second, unspecific assertive narcissism has a strong conceptual overlap with NARQ_ADM_DOM: Both are characterized by a drive for status, social potency, and dominance.

It is also important to note that unspecific assertive narcissism and NARQ_ADM_DOM were related to overclaiming bias even after we controlled for openness to experience. This finding extends the findings of Dunlop et al. (2017), who indicated that overclaiming bias is related to the dispositional tendency to be curious and exploratory (openness) but not to the tendencies to be disingenuous or self-centered. Our results suggest that the relation between narcissism and overclaiming bias is not driven (only) by openness but (also) by narcissistic self-promotion in the social dominance domain (i.e., beliefs in and striving for social status and leadership). Future overclaiming research might want to further test this idea by pitting unspecific assertive narcissism or NARQ_ADM_DOM not only against openness but also against honesty-humility, disingenuousness, and self-centeredness.

Taken together, the current study demonstrates that distinguishing various dimensions and content-specific forms of narcissism can facilitate a deeper understanding of the relations between narcissism and external criteria such as overclaiming bias. We thus encourage future research to further explore nuanced narcissism questionnaires.

3.5 References

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3.6 Supplemental Material

Table 3.2

Content-Specific Assertive Narcissism Items (in German and English) for Intellectual Ability, Physical Attractiveness, and Social Dominance

Item number	Intellectual ability		Physical attractiveness		Social dominance	
	German (original)	English	German (original)	English	German (original)	English
1	Ich bin ausgesprochen intelligent.	I am extraordinarily intelligent.	Ich sehe sehr gut aus.	I am very good looking.	Ich bin sehr durchsetzungsfähig.	I am very assertive.
2	Ich bin ein Genie.	I am a genius.	Ich bin ein sehr attraktiver Mensch.	I am a very attractive person.	Ich bin eine Führungspersönlichkeit.	I am a leader.
3	Ich bin klüger als andere.	I am smarter than others.	Ich bin attraktiver als die meisten anderen Menschen.	I am more attractive than most other people.	Ich bin anderen übergeordnet.	I am superior to others.
4	Ich kenne nur wenige Menschen, die mir intellektuell das Wasser reichen können.	I know only a few people who match me intellectually.	Man wird mich wegen meiner Schönheit bewundern.	I will be admired for my beauty.	Ich werde eine bedeutsame Führungsposition innehaben	I will occupy a significant leadership position.
5	Ich werde für herausragende intellektuelle Leistungen bekannt sein.	I will be famous for my outstanding intellectual achievements.	Ich verdiene Bewunderung für mein außergewöhnlich gutes Aussehen.	I deserve admiration for my remarkably good looks.	Man sollte meine Autorität anerkennen.	People should recognize my authority.
6	Man sollte mich wegen meiner außergewöhnlichen Intelligenz anerkennen.	People should acknowledge me for my extraordinary intelligence.	Ich bin bestrebt, ein anziehendes Äußeres zu präsentieren.	I am striving to present an attractive appearance.	Ich strebe danach, Autorität über andere zu haben	I strive for authority over others.
7	Ich möchte, dass meine überlegenen intellektuellen Fähigkeiten zur Geltung kommen.	I want my superior intellectual abilities to be noticed.	Mein gutes Äußeres gibt mir viel Kraft.	My good looks give me a lot of strength.	Ich genieße es, eine einflussreiche Person zu sein.	I enjoy being an influential person.
8	Ich bin begeistert von meinen intellektuellen Fähigkeiten.	I am amazed by my intellectual abilities.	Ich betrachte mich gerne im Spiegel.	I like to look at myself in the mirror.	Andere anzuführen macht mir Freude.	I take pleasure in leading others.

9	Es gibt nichts Schöneres als anderen zu zeigen, wie schlau ich bin.	There is nothing better than showing how smart I am.	Ich fühle mich unheimlich gut dabei, von anderen aufgrund meines Aussehens bewundert zu werden.	I feel very good when others admire me for my physical appearance.	Ich genieße es, wenn mich andere in meiner Führungsrolle bestätigen.	I enjoy it when others acknowledge my leadership position.
10	Ich genieße es, wenn andere erkennen, wie klug ich bin.	I enjoy it when others recognize how clever I am.	Es ist ein gutes Gefühl, so viel attraktiver zu sein als andere Menschen.	It is a nice feeling to be much more attractive than other people.	Ich genieße meine Autorität über andere.	I enjoy my authority over others.
11	Ich lasse andere Menschen spüren, wie schlau ich bin.	I show other people how smart I am.	Ich zeige, wie attraktiv ich bin.	I show how attractive I am.	Ich zeige anderen, dass ich eine durchsetzungsstarke Person bin.	I show others that I am an assertive person.
12	Ich schaffe es häufig, anderen mit meinen geistreichen Beiträgen zu imponieren.	I am able to impress others with my witty contributions.	Ich nutze mein gutes Aussehen, um mir Vorteile zu verschaffen.	I use my good looks to my advantage.	Im Umgang mit anderen übernehme ich häufig die Führungsrolle.	I often take on the leadership role.
13	Mit Hilfe meines scharfen Verstandes überzeuge ich andere von meiner Meinung.	With my sharp intellect, I convince others to agree with my opinion.	Mit meinem attraktiven Auftreten ziehe ich andere in meinen Bann.	With my attractive appearance, I fascinate others.	In Diskussionen mache ich unmissverständlich klar, wo es lang geht.	In discussions, I clearly spell out what's what.
14	Ich schaffe es oft, andere mit meinen intelligenten Kommentaren zu beeindrucken.	I often manage to impress others with my intelligent comments.	Meine attraktive Erscheinung setze ich häufig geschickt in Szene.	I often skillfully draw attention to my attractive appearance.	Mit meiner gewinnenden Art gelingt es mir meist, andere Menschen zu führen.	With my winning way, I usually succeed in leading others.
15	Mit meinen originellen Einfällen und frischen Ideen bringe ich andere zum Staunen.	With my original and fresh ideas, I astonish others.	Wenn ich einen Raum betrete, ziehe ich alle Blicke auf mich.	When I enter a room, I attract people's attention.	In Gruppensituationen ergreife ich häufig erfolgreich die Initiative.	In groups, I often take the initiative successfully.

Table 3.3

Correlation Analysis Testing how Strong Each Narcissism Dimension is Related to Overclaiming Bias

	Analysis Reported in Main Text (Figure 1)			**Following pre-registered analysis plan: (1) without parcelling, (2) without letting PNI ER load on the antagonistic factor, and (3) without correlated errors between NPI L/A and NPI E/E**	
CFI	.912			.766[c]	
RMSEA	.076			.046	
	*b**	*p*		*b**	*p*
Assertive Narcissism	.11	< .001[a]		.11	< .001[a]
Antagonistic Narcissism	-.02	.64[a]		-.01	.82[a]
Vulnerable Narcissism	-.03	.37[a]		-.03	.37[a]
Test of Difference in Unstandardized Coefficients					
	t	*p*		*t*	*p*
Assertive vs. Antagonistic	4.70	< .001[b]		4.41	< .001[b]
Assertive vs. Vulnerable	3.44	.001[b]		3.64	< .001[b]
Antagonistic vs. Vulnerable	0.71	.48[a]		0.95	.34[a]

Note. *N* = 1682. In both analyses we used full information maximum likelihood estimation—robust maximum likelihood estimation in Mplus—to handle missing values. We did not use pairwise maximum likelihood estimation (PML; Katsikatsou, Moustaki, Yang-Wallentin, Jöreskog; 2012) because PML (as currently implement in lavaan, 0.5-17) does not handle missing data (https://groups.google.com/d/msg/lavaan/ik6WWC6TcYA/eLYBnRqKlAQJ).

[a] = two-sided significance test

[b] = one-sided significance test

[c] = Additionally to the poor model fit, Mplus outputted a warning message saying that the first-order derivative product matrix was non-positive definite, most likely due to NPI variables being dichotomous but declared as continuous.

Table 3.4

Multiple Regression Analysis Testing how Strong Each Narcissism Dimension is Related to Overclaiming Bias

	With parceling; Letting PNI ER load on the antagonistic factor; Correlated errors between NPI L/A and NPI E/E				**Without parceling; Without letting PNI ER load on the antagonistic factor; Without correlated errors between NPI L/A and NPI E/E**			
	Without control variables		**With control variables**		**Without control variables**		**With control variables**	
CFI	.912		.912		.766 [c]		.766 [c]	
RMSEA	.076		.068		.046		.044	
	*b**	*p*	*b**	*p*	*b**	*p*	*b**	*p*
Assertive Narcissism	.19	< .001[a]	.14	.006[a]	.18	< .001[a]	.10	.11[a]
Antagonistic Narcissism	-.14	.022[a]	-.10	.14[a]	-.12	.14[a]	-.05	.60[a]
Vulnerable Narcissism	.03	.53[a]	.01	.81[a]	< .001	.99[a]	-.02	.72[a]
Accuracy Index			-.04	.31[a]			.13	.008[a]
Openness			.10	.003[a]			-.05	.25[a]
Test of Difference in Unstandardized Coefficients								
	t	*p*	*t*	*p*	*t*	*p*	*t*	*p*
Assertive vs. Antagonistic	3.13	.001[b]	2.01	.023[b]	2.43	.008[b]	0.92	.18[b]
Assertive vs. Vulnerable	3.28	.001[b]	2.53	.006[b]	3.36	.001[b]	1.95	.026[b]
Antagonistic vs. Vulnerable	-1.81	.070[a]	-1.12	.26[a]	-1.02	.31[a]	-0.26	.80[a]

Note. *N* = 1682. In both analyses we used full information maximum likelihood estimation—robust maximum likelihood estimation in Mplus—to handle missing values. We did not use pairwise maximum likelihood estimation (PML; Katsikatsou, Moustaki, Yang-Wallentin, & Jöreskog, 2012) because PML (as currently implement in lavaan, 0.5-17) does not handle missing data (see https://groups.google.com/d/msg/lavaan/ik6WWC6TcYA/eLYBnRqKlAQJ).

[a] = two-sided significance test

[b] = one-sided significance test

[c] = Additionally to the poor model fit, Mplus outputted a warning message saying that the first-order derivative product matrix was non-positive definite, most likely due to NPI variables being dichotomous but declared as continuous.

Table 3.5

Correlation Analysis Testing how Strong Each Form of Subdomain Specific Assertive Narcissism is Related to Overclaiming Bias

Estimation	WLSMV			MLR	
CFI	.905			.821	
RMSEA	.077			.069	
	b^*	*p*		b^*	*p*
Intellectual Ability Narcissism	.12	< .001[a]		.12	< .001[a]
Physical Attractiveness Narcissism	.06	.028[a]		.07	.029[a]
Social Dominance Narcissism	.14	< .001[a]		.15	< .001[a]
Test of Difference in Unstandardized Coefficients					
	t	*p*		*t*	*p*
intellectual vs. physical attractiveness	1.81	.035[b]		2.00	.023[b]
intellectual vs. social dominance	-0.50	.69[b]		-0.36	.64[b]
physical attractiveness vs. social dominance	-2.27	.023[a]		-2.40	.017[a]

Note. *N* = 1682. WLSMV = means and variance adjusted weighted least square estimation; MLR = robust maximum likelihood estimation.

[a] = two-sided significance test

[b] = one-sided significance test

Table 3.6

Multiple Regression Analysis Testing how Strong Each Form of Subdomain Specific Assertive Narcissism is Related to Overclaiming Bias

	Without parceling; WLSMV estimator						**Without parceling; MLR estimator**					
	Without control variables			**With control variables**			**Without control variables**			**With control variables**		
CFI	.905			.903			.821			.814		
RMSEA	.077			.076			.069			.066		
	*b**	*p*		*b**	*p*		*b**	*p*		*b**	*p*	
Intellectual Narcissism	.04	.33[a]		.03	.52[a]		.04	.29[a]		.02	.58[a]	
Physical Attractiveness Narcissism	-.03	.39[a]		-.05	.20[a]		-.02	.51[a]		-.04	.32[a]	
Social Dominance Narcissism	.13	.003[a]		.13	.003[a]		.13	.001[a]		.12	.006[a]	
Accuracy Index				-.05	.002[a]					.14	< .001[a]	
Openness				.13	< .001[a]					-.05	.24[a]	
Test of Difference in Unstandardized Coefficients												
	t	*p*		*t*	*p*		*t*	*p*		*t*	*p*	
intellectual vs. physical attractiveness	1.16	.12[b]		1.14	.13[b]		1.09	.14[b]		0.95	.17[b]	
intellectual vs. social dominance	-1.19	.88[b]		-1.33	.91[b]		-1.40	.92[b]		-1.37	.92[b]	
physical attractiveness vs. social dominance	-2.60	.009[a]		-2.83	.005[a]		-2.60	.009[a]		-2.49	.013[a]	

Note. *N* = 1682. We did not use pairwise maximum likelihood estimation (PML; Katsikatsou, Moustaki, Yang-Wallentin, & Jöreskog, 2012) because PML (as currently implement in lavaan, 0.5-17) does not handle missing data (see https://groups.google.com/d/msg/lavaan/ik6WWC6TcYA/eLYBnRqKlAQJ). WLSMV = means and variance adjusted weighted least square estimation; MLR = robust maximum likelihood estimation.

[a] = two-sided significance test

[b] = one-sided significance test

Table 3.7

Correlation Analysis Testing Whether Intellectual Assertive Narcissism is Stronger Related to Overclaiming Bias than Unspecific Assertive Narcissism

Estimation	WLSMV			MLR	
CFI	.904			.784 [c]	
RMSEA	.108			.062	
	b^*	*p*		b^*	*p*
Intellectual Ability Narcissism	.12	< .001[a]		.12	< .001[a]
Unspecific Assertive Narcissism	.13	< .001[a]		.12	< .001[a]
Test of Difference in Unstandardized Coefficients					
	t	*p*		*t*	*p*
Intellectual vs. Unspecific	-0.40	.65[b]		1.25	.11[b]

Note. *N* = 1682. WLSMV = means and variance adjusted weighted least square estimation; MLR = robust maximum likelihood estimation.

[a] = two-sided significance test

[b] = one-sided significance test

[c] = Additionally to the poor model fit, Mplus outputted a warning message saying that the first-order derivative product matrix was non-positive definite, most likely due to NPI variables being dichotomous but declared as continuous.

Table 3.8

Multiple Regression Analysis Testing Whether Intellectual Assertive Narcissism is Stronger Related to Overclaiming Bias than Unspecific Assertive Narcissism

	Partially parceling; WLSMV estimator						**Without parceling; MLR estimator**					
	Without control variables			**With control variables**			**Without control variables**			**With control variables**		
CFI	.904			.903			.784[c]			.777[c]		
RMSEA	.108			.103			.062			.060		
	*b**	*p*		*b**	*p*		*b**	*p*		*b**	*p*	
Intellectual Narcissism	.04	.50[a]		.06	.29[a]		.06	.37[a]		.11	.14[a]	
Unspecific Assertive Narcissism	.10	.12[a]		.04	.56[a]		.06	.39[a]		-.04	.60[a]	
Accuracy Index				-.05	.003[a]					.15	< .001[a]	
Openness				.12	< .001[a]					-.06	.17[a]	
Test of Difference in Unstandardized Coefficients												
	t	*p*		*t*	*p*		*t*	*p*		*t*	*p*	
intellectual vs. physical attractiveness	-0.49	.69[b]		0.21	.42[b]		-0.09	.54[b]		0.94	.17[b]	

Note. *N* = 1682. We did not use pairwise maximum likelihood estimation (PML; Katsikatsou, Moustaki, Yang-Wallentin, & Jöreskog, 2012) because PML (as currently implement in lavaan, 0.5-17) does not handle missing data (see https://groups.google.com/d/msg/lavaan/ik6WWC6TcYA/eLYBnRqKlAQJ). WLSMV = means and variance adjusted weighted least square estimation; MLR = robust maximum likelihood estimation.

[a] = two-sided significance test

[b] = one-sided significance test

[c] = Additionally to the poor model fit, Mplus outputted a warning message saying that the first-order derivative product matrix was non-positive definite, most likely due to NPI variables being dichotomous but declared as continuous.

Table 3.9

Correlation Analysis Testing Whether Social Dominance Assertive Narcissism is Stronger Related to Overclaiming Bias than Unspecific Assertive Narcissism

Estimation	WLSMV			MLR	
CFI	.872			.753 [b]	
RMSEA	.125			.068	
	b^*	*p*		b^*	*p*
Social Dominance Specific Narcissism	.14	< .001[a]		.15	< .001[a]
Unspecific Assertive Narcissism	.14	< .001[a]		.15	< .001[a]
Test of Difference in Unstandardized Coefficients					
	t	*p*		*t*	*p*
Assertive vs. intellectual	1.37	.170[a]		2.56	.011[a]

Note. *N* = 1682. WLSMV = means and variance adjusted weighted least square estimation; MLR = robust maximum likelihood estimation.

[a] = two-sided significance test

[b] = Additionally to the poor model fit, Mplus outputted a warning message saying that the first-order derivative product matrix was non-positive definite, most likely due to NPI variables being dichotomous but declared as continuous.

Table 3.10

Multiple Regression Analysis Testing Whether Intellectual Assertive Narcissism is Stronger Related to Overclaiming Bias than Unspecific Assertive Narcissism

	Partially parceling; WLSMV estimator						**Without parceling; MLR estimator**					
	Without control variables			**With control variables**			**Without control variables**			**With control variables**		
CFI	.872			.878			.753[a]			.753[a]		
RMSEA	.125			.115			.068			.064		
	*b**	*p*		*b**	*p*		*b**	*p*		*b**	*p*	
Social Dominance Specific Narcissism	.10	.28		.19	.052		.05	.82		.39	.22	
Unspecific Assertive Narcissism	.05	.60		-.08	.48		.11	.63		-.30	.38	
Accuracy Index				-.04	.002					.19	.007	
Openness				.14	< .001					-.05	.22	
Test of Difference in Unstandardized Coefficients												
	t	*p*		*t*	*p*		*t*	*p*		*t*	*p*	
Social Dominance vs. Unspecific	0.20	.84		1.27	.20		-0.19	.85		1.02	.31	

Note. *N* = 1682. All significance tests are two-sided. We did not use pairwise maximum likelihood estimation (PML; Katsikatsou, Moustaki, Yang-Wallentin, & Jöreskog, 2012) because PML (as currently implement in lavaan, 0.5-17) does not handle missing data (see https://groups.google.com/d/msg/lavaan/ik6WWC6TcYA/eLYBnRqKlAQJ). WLSMV = means and variance adjusted weighted least square estimation; MLR = robust maximum likelihood estimation.

[a] = Additionally to the poor model fit, Mplus outputted a warning message saying that the first-order derivative product matrix was non-positive definite, most likely due to NPI variables being dichotomous but declared as continuous.

4

Study 3: The Development of Narcissism and Machiavellianism in Early Adulthood

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Abstract

We investigated the development of narcissism and Machiavellianism (Mach) in early adulthood. Specifically, we examined (a) mean-level changes in narcissistic admiration (i.e., the assertive dimension of narcissism; Back et al., 2013) and Mach during early adulthood and (b) how studying economics and experiencing any of 30 life events were related to individual differences in changes in narcissistic admiration and Mach. We used longitudinal data from two cohorts of young adults in Germany (N_1 = 4,962 and N_2 = 2,572). Although mean levels of narcissistic admiration remained stable over time, life events analyses suggested that narcissistic admiration increased among people who experienced a positively evaluated change in their eating or sleeping habits, a positively evaluated romantic break-up, or a negatively evaluated failure on an important exam. The mean levels of Mach decreased during early adulthood in both cohorts. Life events analyses showed that Mach decreased for only the 91% of young adults who had started a new job and evaluated it positively, suggesting that mastering occupational roles mitigates Mach in early adulthood. The results will be discussed in the light of previous longitudinal studies on narcissism in early adulthood and cross-sectional studies on how age is related to narcissism and Mach.

Keywords: narcissism; Machiavellianism; personality development; university major; life events

4. The Development of Narcissism and Machiavellianism in Early Adulthood

4.1 Introduction

Longitudinal research on the Big Five personality traits has revealed that comparatively large and robust changes in personality take place during early adulthood (e.g., Roberts, Walton, & Viechtbauer, 2006; Specht et al., 2014). Except for the Big Five, most personality dimensions such as narcissism and Machiavellianism (Mach)[6] have rarely been studied longitudinally. Hence, it is unclear whether changes similar to those found for the Big Five take place in narcissism and Mach during early adulthood. For example, does the *maturity principle*[7] (e.g., Roberts, Wood, & Caspi, 2008) extend to narcissism and Mach? This might entail a decrease in the mean levels of narcissism and Mach during early adulthood. In line with research on the Big Five, the influences of life experiences on trait development could be explored. The question here could be which types of experiences are associated with individual differences in narcissism and Mach development during early adulthood? To address these questions, in this study, we investigated (a) how mean levels in narcissism and Mach develop over a 10-year period in early adulthood—from age 19.5 to 29.5—and (b) how studying economics and experiencing certain life events are related to individual differences in the development of narcissism and Mach.

4.1.1 Narcissism and Machiavellianism

Narcissism is a personality trait that denotes individual differences in the desire for status, external approval, and grandiosity. Originally, narcissism was thought to be a unidimensional construct (e.g., Raskin & Hall, 1979; Raskin & Terry, 1988). However, in recent years, its conceptualization and measurement have become multidimensional. First, grandiose narcissism has been contrasted with vulnerable narcissism (e.g., Dickinson & Pincus, 2003; Miller et al.,

[6] We focus on only two of the three traits of the "Dark Triad" (Paulhus & Williams, 2002) because psychopathy was not assessed in the current data.
[7] The maturity principle reflects the trend by which people become more emotionally stable, agreeable, conscientious, and socially dominant with age (e.g., Roberts, Wood, & Caspi, 2008).

2011; Wink, 1991). Second, grandiose narcissism has been further subdivided into an assertive dimension (i.e., narcissistic admiration) and an antagonistic dimension (i.e., narcissistic rivalry; Back et al., 2013; see also Brown, Budzek, & Tamborski, 2009; Küfner, Nestler, & Back, 2013; Paulhus, 2001). In the current study, we focused on only narcissistic admiration because repeated measurements were available for only this component of narcissism.

The second personality trait we studied here is Mach. Mach was originally characterized by a cynical worldview, a duplicitous interpersonal style, and pragmatic morality (Christie & Geis, 1970; see also Jones & Paulhus, 2009). Recent conceptualizations of Mach additionally emphasize that people high in Mach are more strategic than impulsive: They plan ahead, form coalitions and alliances, and try to build and maintain a positive reputation (e.g., Jones & Paulhus, 2009, 2014). Christie and Geis' (1970) construction of the prominent Mach IV scale was based on the assumption of three Mach dimensions (i.e., tactics, views, and morality), but later research was not able to confirm this structure (e.g., Corral & Calvete, 2000; Fehr, Samson, & Paulhus, 1992; Kuo & Marsella, 1977). Therefore, the Mach IV and other Mach questionnaires are often scored as unidimensional scales, and a higher order factor that is common to all Mach facets is sometimes assumed (Dahling, Whitaker, & Levy, 2009; Rauthmann & Will, 2011; see also, Fehr et al., 1992).

People high on narcissistic admiration and Mach have been found to share some motivational tendencies. Both are associated with a preference for agentic goals (e.g., status, uniqueness, competence, and superiority) over communal goals (e.g., affiliation, warmth, relatedness, acceptance, and community feelings; e.g., Back et al., 2013; Campbell & Foster, 2007; Dahling et al., 2009; Gebauer et al., 2012; McHoskey, 1999; Rauthmann, 2012; Robins, Tracy, & Shaver, 2001). Yet, people high on narcissistic admiration and Mach differ in the reasons behind their aspirations. People high in narcissistic admiration strive for agentic goals to maintain and aggrandize their high self-esteem and obtain external approval for their grandiose self-views (Back et al., 2013; see also Campbell & Foster, 2007). People high in Mach—on the other hand—strive for agentic goals because of their cynical world view (i.e., cynicism toward life, humans, and how things are run in the world). Their cynicism brings about a devaluation of communal goals and morality as well as fears that others will dominate, hurt, or exploit them if they are not agentic or powerful enough (Christie & Geis, 1970; Láng, 2015).

4.1.2 Mean-Level Changes in Narcissistic Admiration and Mach During Early Adulthood

How should we expect narcissistic admiration and Mach to develop in early adulthood? Past cross-sectional research has reported negative relations between age and total scores on the Narcissistic Personality Inventory (e.g., Barlett & Barlett, 2015: r = -.10; Foster, Campbell, & Twenge, 2003: *r* = -.17; Hill & Roberts, 2012: *r* = -.32). The findings for Mach are more mixed, although they still generally show a negative relation with age (e.g., Barlett & Barlett, 2015: r = -.14; Dahling et al., 2009: *r* = -17; Mudrack, 1989: *r* = -26; Wakefield, 2008: *r* = -.02).

The declining trend suggested by these cross-sectional studies has not been supported by longitudinal studies. But admittedly, for early adulthood, we found only two suitable longitudinal studies on narcissism and none on Mach, and the two studies on narcissism are unique for several reasons. First, Carlson and Gjerde (2009) used observer ratings (i.e., the California Q-Set; Block, 1961) to study narcissism. They detected no significant decrease in narcissism from age 18 to 23. Second, Orth and Luciano (2015) reported virtually no descriptive differences on Narcissistic Personality Inventory scores across four measurement occasions spanning a 2-year period during early adulthood. Because of their unique measures or short time frames, neither study provides a strong basis from which to hypothesize how mean levels of narcissistic admiration and Mach should change in early adulthood.

Taken together, past cross-sectional studies suggest that narcissistic admiration and Mach decline, whereas longitudinal research shows no change. Given these mixed findings and the paucity of longitudinal research, we had no clear expectations for mean-level changes in narcissistic admiration and Mach.

4.1.3 Experiences Related to Changes in Narcissistic Admiration and Machiavellianism During Early Adulthood

Neither the existence nor the lack of mean-level differences over time implies or precludes interindividual differences in the development of narcissistic admiration or Mach (Roberts & Mroczek, 2008). For example, changes in a person characteristic may be uniform for all individuals, implying mean differences without interindividual differences in the trajectories. It is also possible for means to remain stable over time despite intraindividual variability if the increase in some individuals' narcissistic admiration and Mach levels counterbalances decreasing

levels in other individuals in the population. Thus, we also investigated the extent to which individual differences in the development of narcissistic admiration and Mach exist and how such individual differences are linked to specific life experiences during early adulthood. The links between changes in personality and antecedent or concurrent life experiences are often called *socialization effects* (e.g., Orth & Luciano, 2015; Specht et al., 2014). The experiences we examined consisted of studying economics and a list of life events tailored to young adults. We focused on the choice to study economics because prior research has suggested that economics university students are higher in narcissism (Westerman, Bergman, Bergman, Westerman, & Daly, 2012) and Mach (McLean & Jones, 1992; Skinner, 1981; but see also Li-Ping Tang, Chen, & Sutarso, 2008) than students in other majors. Furthermore, some studies have suggested that university students' immoral tendencies are fostered when they study economics (for a review, see Etzioni, 2015). For example, students who attended a class on game theory became more cynical and less honest—which is highly consistent with Mach—over the course of one semester than students who took an astronomy class (Frank, Gilovich, & Regan, 1993). Thus, we hypothesized that studying economics would be positively related to changes in narcissism and Mach during early adulthood.

It is also possible that higher levels of narcissistic admiration and Mach among economics students (and among people who experience certain life events) are due to *selection effects*: People high in narcissistic admiration and Mach might more frequently select or be selected by certain environments than people low in narcissistic admiration and Mach. For example, people high in narcissistic admiration and Mach might be more likely to select an economics major for their studies because it is more in line with their preference for agentic goals over communal goals. The domain of economics emphasizes self-interest and rationality, neglects considerations of fairness and loyalty (Kahneman, 2003; Kahneman, Knetsch, & Thaler, 1986), and gives people access to extensive resources and future leadership positions. Hence, an association between an environmental factor and narcissistic admiration or Mach does not necessarily imply socialization effects. To prevent invalid attributions, we simultaneously tested each socialization effect with its corresponding selection effect.

No previous studies have provided evidence that certain life events are related to changes in narcissistic admiration and Mach. Orth and Luciano (2015) tested whether the experience of stressful life events such as a serious accident/injury or a serious failure in education/work was

linked to changes in narcissism over a 2-year period in early adulthood and found no evidence for it. In the current research, we tested the socialization effects of 30 individual life events. We additionally aggregated the life events into agency event scores (i.e., events related to competence, extraversion, uniqueness, separation, and focus on the self) and communion event scores (i.e., events related to warmth, agreeableness, relatedness, connection, and focus on others; Gebauer et al., 2012; see also Bakan, 1966). Examples of agentic events include experiences such as "winning an academic award" or "starting a new job." Examples of communal events include experiences such as "illness or injury of a friend" or "getting married." Because narcissistic admiration and Mach are characterized by a preference for agentic goals over communal goals, positive agentic and negative communal events might lead to increases and negative agentic and positive communal events to decreases in narcissistic admiration and Mach. As there had been no prior longitudinal research on this topic, these analyses were entirely exploratory.

4.1.4 The Present Research

To investigate the development of narcissism and Mach in early adulthood and how it is related to studying economics and 30 life events, we analyzed data from two cohorts from the Transformation of the Secondary School System and Academic Careers longitudinal study (TOSCA; Köller, Watermann, Trautwein, & Lüdtke, 2004; Trautwein, Neumann, Nagy, Lüdtke, & Maaz, 2010): TOSCA-2006 and TOSCA-2002. In the TOSCA study, several thousand German students were surveyed regarding educational trajectories, personality, life events, and other constructs every second year from around age 19.5 to 25.5 in the TOSCA-2006 cohort and from around age 19.5 to 29.5 in the TOSCA-2002 cohort. Narcissistic admiration and Mach were assessed from age 19.5 onwards in the TOSCA-2006 cohort and from age 21.5 onwards in the TOSCA-2002 cohort.

First, mean-level changes in narcissistic admiration and Mach during early adulthood were examined in both cohorts (TOSCA-2006 and TOSCA-2002). Second, in the cohort in which narcissistic admiration and Mach were assessed before students entered tertiary education (TOSCA-2006), we investigated associations between studying economics and changes in narcissistic admiration and Mach. Third, in the cohort in which 30 life events were assessed (TOSCA-2002), we investigated associations between life events and changes in narcissistic admiration and Mach. In all models in which associations between experiences (i.e., studying economics and life events) and changes in narcissistic admiration and Mach were tested, we

simultaneously tested for selection effects and included several control variables; results without control variables are reported in the supplemental online material.

4.2 Method

4.2.1 Participants and Procedure

4.2.1.1 TOSCA-2006

The TOSCA-2006 cohort was first assessed in their final year of high school (Grade 13; age: M = 19.45; SD = 0.72), and this group was reassessed four times with a time interval of roughly 2 years between the measurement occasions (for details, see Trautwein et al., 2010). Students voluntarily participated without any financial incentive at the first measurement occasion. Financial incentives were provided at the subsequent times points.

At Time 1, the cohort consisted of 4,944 German students from 157 upper secondary schools—the same 147 schools as in the TOSCA-2002 cohort (see below) and 10 additional vocational secondary schools ("berufliche Gymnasien"). The participation rate was quite high: 97% of the schools and around 80% of the targeted 6,177 students participated. The sample size for the mean-level analyses was 4,962 for narcissism and 4,934 for Mach.[8]

The sample size for the analyses on the students who were studying economics was considerably lower (N = 1,950; 321 economics students and 1,629 noneconomics students) because almost half of the participants participated only at Time 1 (Chapter 4.6: Table 4.4),[9] and some participants did not continue their studies after high school. We excluded people who did not indicate a university major at Time 2 (i.e., a sign that they did not continue their studies after high school) or who indicated that they were no longer studying at Time 3.

[8] The sample size for the mean-level analysis is slightly larger than the sample size at Time 1 because a few people participated only after Time 1.

[9] A reason for the large attrition rate could be that at Time 1, the questionnaire was administered in the high school, whereas after Time 1, it was administered via mail. Thus, participants might have felt more obliged to participate at Time 1 than thereafter.

4.2.1.2 TOSCA-2002

Students and schools in the TOSCA-2002 cohort were randomly selected at Time 1 (i.e., Grade 13; age: M = 19.60; SD = 0.72). The sample consisted of 4,633 students from 147 traditional and vocational secondary schools ("Allgemeinbildende und berufliche Gymnasien"). The participation rate was high with a school-level participation rate of 99% and a student-level rate of around 79%; the number of targeted students was 5,901. We excluded two persons from the 2002 cohort who indicated that they were older than 30 at measurement Time 1. The cohort was reassessed every 2 years, for a total of six times (for details, see Köller et al., 2004). Again, students participated voluntarily with no compensation at Time 1 and with financial incentives afterwards.

In the TOSCA-2002 cohort, narcissistic admiration and Mach were assessed at measurement Time 2 onwards. Thus, the sample size for the mean-level analysis was 2,571 for narcissistic admiration and 2,572 for Mach (i.e., 54.4% of the sample that participated at Time 1). In the life events analyses, the sample size increased to 4,640 in the models with control variables because some control variables were assessed at Time 1.

4.2.1.3 Attrition and missing values

Attrition effects were small in both cohorts: People who participated only at the first measurement occasion were a bit higher in Mach (TOSCA-2006: Cohen's d = 0.18; TOSCA-2002: not assessed at Time 1), had higher grade point averages (TOSCA-2006: d = 0.40; TOSCA-2002: d = 0.36), and were more likely to be male than people who also participated at later measurement occasions (for details, see Chapter 4.6: Table 4.4). It is important to note that cases with incomplete data were not excluded from the analyses (unless stated otherwise). Instead, we used full information maximum likelihood estimation to account for item nonresponses and attrition (Enders, 2010).

4.2.1.4 Pre-registration of hypotheses

Prior to analyzing the data, we pre-registered hypotheses on the socialization and selection effects of studying economics on the development of narcissism and Mach (see https://osf.io/a9y7s/?view_only=742e30db262f47f8acac69039f847eb7). We did not register any hypotheses on the mean-level development or life events analyses. For the preregistered

hypotheses, we report one-sided *p*-values. For the exploratory research questions, we report two-sided *p*-values, and we report only effects that are significant at $p \leq .01$ in the text (all effects are reported in the tables).

4.2.2 Measures

4.2.2.1 Narcissism

Narcissism was measured with six 4-point Likert-type scale items that are German adaptations of items from the Narcissistic Personality Inventory (Raskin & Hall, 1979; 1 = *not true at all*; 4 = *completely true*; all αs > .83; for item content, means, standard deviations, and item-total correlations, see Chapter 4.6: Table 4.5). We conducted three studies to validate the items. In these studies, the latent trait of the TOSCA narcissism scale was most strongly correlated with the latent trait of the Narcissistic Admiration subscale from the Narcissistic Admiration and Rivalry Questionnaire, r = .83 and .81, respectively (in one of the three validation studies, the Narcissistic Admiration and Rivalry Questionnaire was not administered; for details, see Chapter 4.6: Text 4.1 and Tables 4.6 to 4.8).

4.2.2.2 Machiavellianism

Mach was measured with six newly created 4-point Likert-type scale items (1 = *not true at all*; 4 = *completely true*; all αs > .81; for item content, means, standard deviations, and item-total correlations, see Chapter 4.6: Table 4.5). The most common Mach instrument at the time of the study, the Mach IV scale (Christie & Geis, 1970), was avoided due to poor psychometric properties (for a critical evaluation of the Mach-IV, see e.g., Dahling et al., 2009). In the validation studies, the latent trait of the TOSCA Mach scale was strongly correlated with the latent trait of the MACH-IV (Christie & Geis, 1970), r = .80, and the Mach subscale from the Short Dark Triad (Jones & Paulhus; 2014), r = .76. The latent trait of the TOSCA Mach scale was also strongly correlated with the latent trait of the Interpersonal Manipulation facet from the Self-Report Psychopathy Scale SRP-III (Williams, Nathanson, & Paulhus, 2003), r = .78 (for details, see Chapter 4.6: Text 4.1 and Tables 4.6 to 4.8). The high correlation between TOSCA Mach and Interpersonal Manipulation is not surprising given that established Mach scales are

often highly correlated with this particular facet of the SRP-III (e.g., Jones & Figueredo, 2013; see also Chapter 4.6: Table 4.6).

4.2.2.3 Economics major

University major was assessed through one open question "Which major are you currently studying?" The answers were categorized into economics majors (business, economics, etc.; D = 1) and noneconomics majors (D = 0).

4.2.2.4 Life events

Participants from the TOSCA-2002 cohort were asked every 2 years about the experience of one or more of 34 life events. The list was based on a modified version of the Life Experience Survey (Sarason, Johnson, & Siegel, 1978; Vaidya, Gray, Haig, & Watson, 2002). Three of the 34 events were excluded from the analyses because they were assessed at only some of the measurement occasions. One event ("Was detained in a prison or comparable institution") was excluded because its base rate was too low (i.e., it was experienced by only four participants). We used only the life events reports from the last four measurement occasions because personality needs to be assessed before the events to control for selection effects. At each measurement occasion, participants were asked whether each of the 30 life events had occurred in the last 2 years or not. If participants indicated that a life event had occurred, they were asked to rate the meaning of the life event (1 = *very negative*, 2 = *negative*, 3 = *irrelevant*, 4 = *positive*, 5 = *very positive)*.

Because the base rate for most life events was relatively low (i.e., only a few people experienced most events in a particular 2-year time period), we aggregated the responses to the life events questions across the four times of measurement. The aggregation was implemented to create a more reliable and accurate estimate of the associations between experienced events and change in personality. There was no one ideal way to aggregate the events. Thus, we aggregated them in three ways: We aggregated them into (1) 30 positive and 30 negative *event dummies*, (2) 30 positive and 30 negative *continuous event scores*, and (3) two *agency* and two *communion event scores* (for detailed descriptions of the methods of aggregation, see Figure 4.1 and its caption).

Person 1 at Time 3

	Happened in last 2 years?	Meaning ?
Started a new job	No (0)	-
Won an academic award or prize	Yes (1)	Positive (1)
…		
Got married	No (0)	-

Person 1 at Time 4

	Happened in last 2 years?	Meaning ?
Started a new job	Yes (1)	Very negative (2)
Won an academic award or prize	No (0)	-
…		
Got married	No (0)	-

Person 1 at Time 5

	Happened in last 2 years?	Meaning ?
Started a new job	Yes (1)	Positive (1)
Won an academic award or prize	No (0)	-
…		
Got married	No (0)	-

Person 1 at Time 6

	Happened in last 2 years?	Meaning ?
Started a new job	Yes (1)	Irrelevant (0)
Won an academic award or prize	No (0)	-
…		
Got married	Yes (1)	Very positive (2)

1

Event Dummies and Continous Event Scores for Person 1

	Positive Event Dummy	Negative Event Dummy	Positive Continuous Event Score	Negative Continuous Event Score
Started a new job	1	1	0.25	0.50
Won an academic award or prize	1	0	0.25	0
…				
Got married	1	0	0.50	0

2

Agency and Communion Ratings by Experts

	Agency	Communion
Started a new job	1.67	-0.89
Won an academic award or prize	1.67	-1.40
…		
Got married	-1.24	2.02

3

Agency and Communion Event Scores for Person 1

	Positive Agency Score	Negative Agency Score	Positive Communion Score	Negative Communion Score
Person 1	0.25 * 1.67 + 0.25 * 1.67 + … + 0.50 * 0	0.50 * 1.67 + 0 * 1.67 + … + 0 * 0	0.25 * 0 + 0.25 * 0 + … + 0.50 * 2.02	0.50 * 0 + 0 * 0 + … + 0 * 2.02

Figure 4.1. Illustration of aggregation of life events variables into three kinds of aggregate scores: (1) event dummies, (2) continuous event scores, and (3) agency and communion event scores. "Person 1" is a fictional person. Because the first occurrence of a particular event might impact the development of narcissistic admiration and Mach more than later occurrences of the same event, we (1) computed 30 positive and 30 negative *event dummies* that indicate whether each of the 30 events occurred at least once over the 8-year time period as a positive and negative event, respectively. For example, Person 1 experienced the event "started a new job" three times over the 8-year period and that person rated these events as very negative, positive, and irrelevant, respectively. Thus, the person had a value of 1 for the positive event dummy and 1 for the negative event dummy for the life event "started a new job." For some events, the frequency of the occurrence and its intensity (positive vs. very positive) might influence the development of narcissistic admiration and Mach. Thus, we (2) computed 30 positive and 30 negative *continuous event scores*: For each event, we calculated the mean positive and mean negative rating at the four measurement occasions, where event occurrences that were positively (negatively) rated were coded as 1 or 2 depending on the intensity (meaning); nonoccurrences and event occurrences that were evaluated negatively (positively) or irrelevant were coded 0. Accordingly, Person 1 had a value of 0.25 as a positive continuous event score and 0.50 as a negative continuous event score for the life event "started a new job." To further investigate whether a whole category of events (e.g., positive agentic events) was related to the development of narcissistic admiration and Mach, we (3) computed agency and communion event scores. For this purpose, four authors ("experts") of the current study rated the 30 life events on a 6-point Likert-type scale in terms of agency and communion (e.g., "How agentic is the event? How relevant is the event for the agency domain?"). The interrater reliabilities of these ratings were high: the two-way mixed, consistency, average-measures ICC was .85 for agency and .80 for communion (Cicchetti, 1994; Hallgreen, 2012; calculated by the R package irr version 0.84; Gamer, Lemon, Fellows, & Singh, 2012). We then multiplied the positive and negative continuous event score of every event by the average agency (communion) rating for that event if the event had an above average (> 0) agency (communion) rating. Events that had a below average rating (< 0) on agency (communion) were not taken into account in these calculations. Finally, we summed up the resulting products of all 30 events, resulting in four scores: positive agency, negative agency, positive communion, and negative communion scores.

Participants who did not respond to the life events questions for a specific event at all four measurement occasions were given a missing value on the two event dummies and two continuous event scores for that event. For most events, between 800 and 850 participants responded at all four measurement occasions (i.e., around 800 to 850 nonmissing values). Participants who did not respond to all life events at all four measurement occasions were given missing values on the agency and communion event scores, resulting in 488 nonmissing values on these four scores.

4.2.2.5 Control variables

We ran the studying economics and life events analyses with and without control variables. The control variables consisted of participants' initial level of self-esteem (i.e., the mean score on three German items from the Rosenberg Self-esteem Scale; Rosenberg, 1965; see also Rieger, Göllner, Trautwein, & Roberts, 2016; TOSCA-2006: α = .80, TOSCA-2002: α = .84), gender, age, grade point average on the Abitur (i.e., high-school diploma after 13 years of school), figural and verbal reasoning (weighted likelihood estimates on Subscales N2 and V4 from the "Kognitiven Fähigkeitstest" [cognitive abilities test]; Heller & Perleth, 2000), a dummy for whether the participant indicated that she/he had been born abroad, a dummy for whether the participant indicated that her/his parents had been born abroad, and the education level of the participants' parents (i.e., education of father and mother averaged). In the analyses on economics majors, we additionally controlled for attendance of a vocational high school focused on economics because graduating from such a high school was thought to influence whether a student would choose an economics major at university or not. In the life events analyses, we additionally included a dummy as a control variable that indicated whether a participant was studying or not at measurement Time 2: Around 76% were studying.

4.2.3 Data-Analytic Strategy

We ran all analyses separately for narcissistic admiration and Mach because it was not the goal of the current study to investigate the relations between the development of narcissistic

admiration and Mach, and the two traits were only weakly correlated (at Time 1 in the TOSCA-2006 cohort: $r = .14$; $p \leq .001$; at Time 2 in the TOSCA-2002 cohort: $r = .06$; $p = .016$).

We took into account measurement error in narcissistic admiration and Mach by using structural equation models with narcissistic admiration and Mach as latent variables measured with six indicators per each measurement occasion. In order to quantify change in the latent variables over time, we assumed strong measurement invariance. [10] Hence, the factor loadings and intercepts of each narcissistic admiration and Mach item were set equal across measurement occasions for all items in both cohorts.

Furthermore, in all models, the errors of the same indicator were allowed to correlate across measurement occasions to account for the item's specificity, which can cause inflated estimates of stability in latent variables over time (Marsh & Hau, 1996; see also Bollen & Curran, 2006). We used maximum likelihood estimation with robust standard errors in Mplus (version 7.3; Muthén & Muthén, 2014). Data handling and analyses were facilitated by using R (version 3.3.1; R Core Team, 2016) and the R package MplusAutomation (version 0.6-3; Hallquist & Wiley, 2014). The R code and Mplus output files can be found at: https://osf.io/ar7h6/?view_only=5af0caa9b0984b7d89c3ff0ba1dde563.

4.2.3.1 Mean-level analysis

To descriptively assess the mean levels and mean-level changes in narcissistic admiration and Mach across time, we first fit a latent state model (e.g., Steyer & Schmitt, 1990) to the data. In order to identify and scale the latent variables, we used the effects-coding method (Little, Slegers, & Card, 2006), which ensures that the latent traits will be scaled in the metric of the

[10] In a global test of measurement invariance (ΔCFI < .01; Chen, 2007), strong measurement invariance across time held for both scales (i.e., narcissistic admiration and Mach) in the TOSCA-2002 cohort. In the TOSCA-2006 cohort, there was some evidence that strong measurement invariance did not hold for both scales: The difference in CFI was slightly larger than .01 between the model with and the model without fixed loadings and intercepts across measurement occasions. Thus, we additionally ran all TOSCA-2006 analyses (i.e., mean-level change and analyses on economics majors) with trimmed scales: On the basis of a visual inspection of the changes in the intercept parameters across measurement occasions, we excluded narcissistic admiration Item 2 and Mach Item 1 from the narcissistic admiration and Mach scale, respectively. Because the TOSCA-2006 results for the trimmed scales were not meaningfully different from the results for the complete scales, we report only the results for the complete scales in the manuscript (for details, see https://osf.io/ar7h6/?view_only=5af0caa9b0984b7d89c3ff0ba1dde563)

items. Hence, the mean of the factor loadings of the indicators of each latent variable were fixed to one, and the sum of the corresponding measurement intercepts was fixed to zero.

To test whether mean levels in narcissistic admiration and Mach significantly changed during early adulthood, we fitted a true individual change model (Steyer, Eid, & Schwenkmezger, 1997) to the data. The model is depicted in Figure 4.2. However, unlike in Figure 4.2, the model did not contain any predictors (studying economics, life event variables, or control variables) when we tested mean-level changes. The true individual change model enabled us to model the total change between the first and last measurement occasions (TOSCA-2006: T4-T1; TOSCA-2002: T6-T2) without imposing assumptions about the pattern of change. Therefore, in contrast to a linear latent growth curve model (Bollen & Curan, 2006), there is no residual variance in latent state variables, and no assumption of linear growth is imposed.

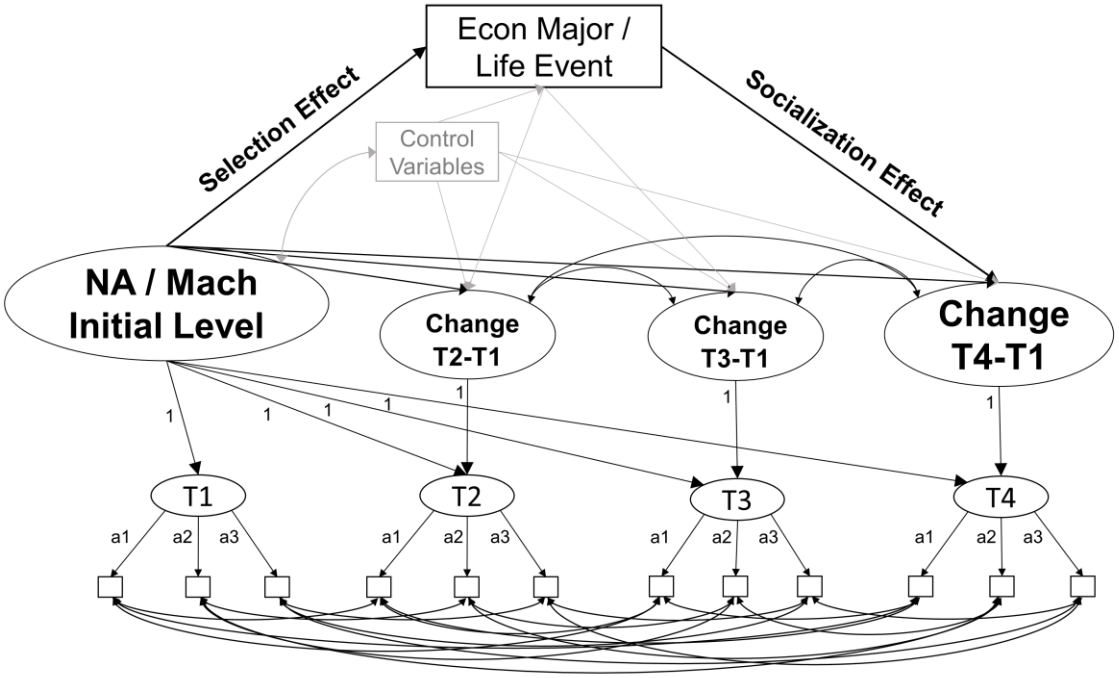

Figure 4.2. Simplified version of the true individual change model that we fit to test socialization (and selection) effects of majoring in economics and life events on change in narcissistic admiration (NA) and Machiavellianism (Mach). For simplification, the figure displays only three of the six items. Furthermore, there are five measurement occasions in the life events models (TOSCA-2002 cohort): from T2 to T6.

4.2.3.2 Studying economics (TOSCA-2006 cohort)

We tested socialization and selection effects for economics majors also with the true individual change model.[11] To test for socialization effects, the change in narcissistic admiration or Mach between the first and last measurement occasions (T4-T1) was regressed on the choice of major (i.e., economics vs. another major; Figure 4.2). Selection effects were tested by logistically regressing the choice of major on the initial level of narcissistic admiration or Mach. We ran the analysis on economics majors with and without control variables. Because the results barely changed, we report only the results with control variables in the main document (for a comparison of the results with and without control variables, see Chapter 4.6: Table 4.9).

4.2.3.3 Life events (TOSCA-2002 cohort)

To investigate socialization and selection effects with regard to the event dummies and continuous event scores, we fit 2 (narcissistic admiration vs. Mach) × 2 (positively vs. negatively evaluated) × 2 (event dummies vs. continuous event scores) models for each of the 30 life events, resulting in 240 true individual change models. To investigate socialization and selection effects regarding agency and communion event scores, we fit 2 (narcissistic admiration vs. Mach) × 2 (agency vs. communion) × 2 (positively vs. negatively evaluated) true individual change models to the data, resulting in eight models.

Analogous to the models for economics majors, the change (T6-T2) in narcissistic admiration or Mach was regressed on the life events variable to test for socialization effects, and the life events variable was regressed on the initial level of narcissistic admiration or Mach to test for selection effects (see Figure 4.2). Again, the results with control variables were not very different from the results without control variables (for a comparison of the results with and without control variables, see Chapter 4.6: Table 4.10 to 4.14).

To illustrate the sizes of the significant socialization effects, for each event, we ran a multiple group analysis in which we fit a latent state model to the group of people who

[11] We did not use latent growth curve models with linear terms to test for socialization effects because the latent growth curve models used to model the mean-level change indicated nonlinear patterns of change (see also Figure 4.3), and a considerable proportion of the variance in narcissism and Mach was not explained by the linear growth curve models. We also did not opt for latent growth curve models with linear and quadratic terms because socialization effects would be difficult to interpret in such models.

experienced the life event and to the group of people who did not experience the life event. The mean-level development of the two groups was then plotted to get a sense of the effect size. To plot the mean levels, we used the R package ggplot2 (version 2.2.1; Wickham & Chang, 2016).

4.3 Results

4.3.1 Mean-Level Changes (TOSCA-2006 and TOSCA-2002)

First, we investigated the mean-level changes in narcissistic admiration and Mach in both cohorts. The mean levels of narcissistic admiration did not decrease or increase during early adulthood (Figure 4.3): In both cohorts, none of the means changed more than 0.1 standard deviations from one measurement occasion to the next (Table 4.1). The small changes that did occur showed no consistent pattern. Accordingly, the mean-level change in narcissistic admiration from first to last measurement occasion was neither significant in the TOSCA-2006 cohort (d = -.01; p = .70) nor in the TOSCA-2002 cohort (d = .03; p = .051).

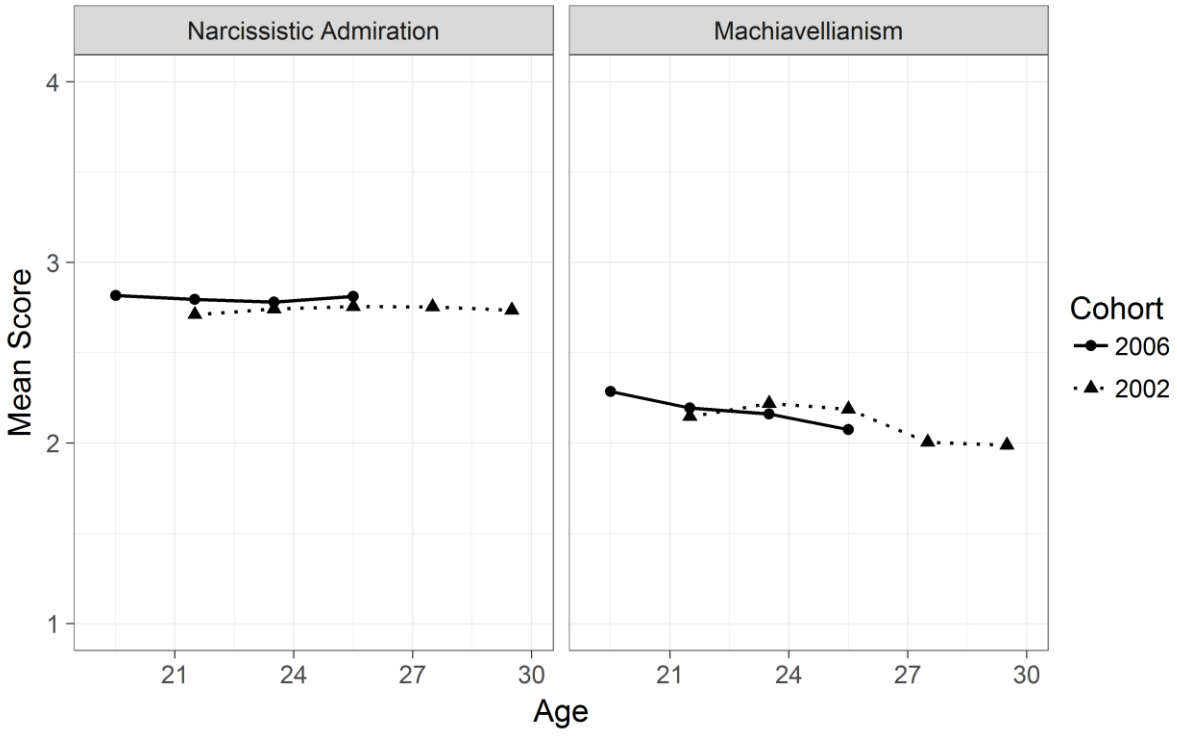

Figure 4.3. Mean-level change in narcissistic admiration and Machiavellianism in both cohorts (TOSCA-2006 and TOSCA-2002). The results are based on latent state models (e.g., Steyer & Schmitt, 1990). The response format of the narcissistic admiration and Machiavellianism items was a 4-point Likert-type scale ranging from 1 = *not true at all* to 4 = *completely true* (for item content, see Chapter 4.6: Table 4.5).

By contrast, Mach gradually declined in early adulthood (Figure 4.3). Mean levels decreased in each of the seven time lags (across both studies) except for one (Table 4.1). One decrease was even more than one third of the pooled standard deviation. Accordingly, the mean-level change in Mach from first to last measurement occasion was significant in the TOSCA-2006 cohort ($d = -.40$; $p \leq .001$) and in the TOSCA-2002 cohort ($d = -.34$; $p \leq .001$).

Table 4.1
Results for Latent State Models: Mean Levels, Mean-Level Changes, and Fit Indices

	Narcissistic admiration		**Machiavellianism**	
Measurement Time	TOSCA-2006 *N* = 4962	TOSCA-2002 *N* = 2571	TOSCA-2006 *N* = 4934	TOSCA-2002 *N* = 2572
		Means		
T1	2.82	-	2.29	-
T2	2.80	2.71	2.19	2.15
T3	2.78	2.74	2.16	2.22
T4	2.81	2.76	2.07	2.19
T5	-	2.75	-	2.00
T6	-	2.74	-	1.99
		Pooled standard deviations		
	0.48	0.47	0.57	0.54
		Mean-level changes (*d*)		
T12	-0.04	-	-0.16	-
T23	-0.03	0.07	-0.06	0.13
T34	0.07	0.03	-0.15	-0.06
T45	-	0.00	-	-0.34
T56	-	-0.04	-	-0.03
		Fit indices		
CFI	.967	.977	.973	.977
RMSEA	.028	.024	.025	.023
SRMR	.040	.042	.032	.030

Note. The response format for the narcissistic admiration and Machiavellianism items was a 4-point Likert-type scale ranging from 1 = *not true at all* to 4 = *completely true* (for item content, see Chapter 4.6: Table 4.5). *d* = (mean - mean of previous measurement time) / pooled standard deviation.

4.3.2 Selection Effects

Although the focus of this study is on mean-level changes and socialization effects, we will also briefly report selection effects for completeness and because we had hypotheses about selection effects for economics majors.

4.3.2.1 Studying economics (TOSCA-2006)

In contrast to our hypotheses, people who were high in narcissistic admiration at Time 1 did not show higher odds of selecting an economics university major than people who were low in narcissistic admiration (with control variables: *OR* = 0.92; one-sided *p*-value = .72; Chapter 4.6: Table 4.9). In other words, there was no selection effect of narcissistic admiration on choosing an economics major. In line with our hypotheses, the probability of choosing an economics major increased with the level of Mach at Time 1 (with control variables: *OR* = 2.13; one-sided p-value $\leq .001$; Chapter 4.6: Table 4.9).

4.3.2.2 Life events (TOSCA-2002)

We report only the results for the agency and communion event scores in the main document (for selection effects on event dummies and continuous event scores, see Chapter 4.6: Tables 4.10 and 4.11). Narcissistic admiration at Time 1 was positively associated with the subsequent occurrence of negative agency events, and Mach was negatively associated with the subsequent occurrence of positive communion events (Table 4.2; see also Chapter 4.6: Table 4.12). In other words, people high in narcissistic admiration at age 21 experienced negative agency events in the following years more often than people low in narcissistic admiration at age 21, and people high in Mach experienced positive communion events less often than people low in Mach.

Table 4.2
Selection and Socialization Effects for Agency and Communion Event Scores

Event score	***Selection effects***		***Socialization effects***	
	Narcissistic admiration	Machiavellianism	Narcissistic admiration	Machiavellianism
Positive agency	.07	.11	.08	-.05
Negative agency	.16**	-.04	.08	.09
Positive communion	.02	-.16**	-.04	-.07
Negative communion	.13*	.08	.02	.07

Note. Standardized regression coefficients from 16 separate regression analyses that were performed in eight different true individual change models (Figure 4.2). In all models, we controlled for initial level of self-esteem, gender, age, grade point average, figural and verbal reasoning, a dummy for whether the participant indicated having been born abroad, a dummy for whether the participant indicated that her/his parents had been born abroad, the education of the participants' parents, and a dummy that indicated whether a participant was studying. In the socialization effects models, we additionally controlled for the initial level of narcissistic admiration or initial level of Machiavellianism (depending on the dependent variable). For results without control variables, see Chapter 4.6: Table 4.12. DV = dependent variable; IV = independent variable.
* $p \leq .05$, ** $p \leq .01$.

4.3.3 Experiences Related to Changes in Narcissistic Admiration and Machiavellianism During Early Adulthood (Socialization Effects)

In the following, standardized coefficients (β) are reported if available, that is, when no categorical variables were in the model (i.e., models with continuous event scores and agency and communion event scores). If there were categorical variables in the model (i.e., models with economics majors or event dummies), only unstandardized coefficients (*b*) are reported because Mplus (version 7.3; Muthén & Muthén, 2014) did not provide standardized coefficients.

4.3.3.1 Studying economics (TOSCA-2006)

In contrast to our hypotheses that majoring in economics would have a socialization effect on narcissism and Mach, majoring in economics was not associated with the change in narcissistic admiration or Mach between age 19.5 and 25.5 (narcissistic admiration: $b = -0.01$, $p = .65$; Mach: $b = 0.06$, $p = .087$; both *p*-values are one-sided; Chapter 4.6: Table 4.9).

4.3.3.2 Life events (TOSCA-2002)

4.3.3.2.1 Event dummies and continuous event scores

Several individual life events were associated with change in narcissistic admiration (Table 4.3).

Table 4.3

Results of Regressions of Changes in Narcissistic Admiration and Machiavellianism on 30 Life Events (Socialization Effects)

Event	**Expert rating**		**Base rate (dum = 1)**		**Narcissistic admiration**				**Machiavellianism**			
					Positive		Negative		Positive		Negative	
	Agency	Comm -union	Positive	Negative	dum *b*	cont β	dum *b*	cont β	dum *b*	cont β	dum *b*	cont β
Started a new job	1.67	-0.89	91%	7%	.03	.06	.01	.00	**-.20****	**-.12****	.10	.07
Won an academic award or prize	1.67	-1.40	45%	1%	.04	.07*	-^{a}	-^{a}	.01	.02	-^{a}	-^{a}
Got promoted at work	1.51	-0.89	41%	0%	-.02	-.02	-^{a}	-^{a}	.05	.04	-^{a}	-^{a}
Began regular work after graduation	1.51	-0.38	51%	3%	.02	.07	.01	.00	-.01	-.02	.16	.06
Increased working hours	1.34	-1.06	21%	44%	-.04	-.02	.03	.05	-.04	-.03	.07	.08
Change in financial situation (much better or worse)	1.18	-0.89	84%	29%	-.03	.01	.05	.09*	-.03	-.03	.07	.06
Quit a job / Lay-off	1.18	-0.38	5%	19%	.10	.06	.02	.00	-.10	-.06	.05	.05
Changed major/stopped university studies/apprenticeship	1.02	-0.89	17%	4%	.05	.08	.04	.06	-.04	-.02	.13	.06
Failed an important exam	0.86	-1.06	8%	29%	-.04	-.01	**.10****	.06	-.06	-.04	-.01	-.01
Changed to another university/apprenticeship	0.86	-0.38	22%	3%	.08*	**.11****	.04	.06	.00	.01	-.06	-.01
Went abroad	0.38	-0.03	95%	2%	-.15*	-.04	.14	.07*	.01	-.01	.11	.06
Moved out of home	0.05	0.48	54%	4%	-.06	.00	.03	.00	.00	.00	-.03	-.01
Borrowed a large amount of money (more than €1,000)	0.05	-0.72	8%	15%	-.03	-.03	.06	.06	.02	.01	-.02	.00
Own injury or illness	-0.27	-0.38	3%	54%	.03	.00	.03	.06	-.15	-.05	.04	.06
Quit smoking	-0.27	-0.72	17%	1%	-.03	-.01	-^{a}	-^{a}	.09	.07	-^{a}	-^{a}

Change in eating habits (much more or less food intake)	-0.43	-0.89	34%	26%	**.10****	**.11****	-.05	-.04	.05	.03	.03	.00
Convicted for a minor offence (fare dodging, speeding, etc.)	-0.59	-0.55	4%	24%	-.04	-.01	.02	.02	.11	.03	-.02	-.01
Started psychotherapy	-0.59	0.48	13%	2%	.07	.08	-.06	-.05	.04	-.01	-.17	-.05*
Broke off a relationship with a boyfriend/girlfriend	-0.75	1.16	18%	48%	**.11****	**.10****	.00	.02	.01	.02	.08*	.08
Illness or injury of a family member	-0.75	1.16	2%	77%	.01	.01	-.01	.00	-.02	-.02	-.02	.01
Illness or injury of a friend	-0.75	1.16	1%	45%	-^{a}	-^{a}	.02	.06	-^{a}	-^{a}	-.05	-.03
Change in sleeping habits (much more or less sleep)	-0.75	-1.06	15%	39%	**.14****	**.11*****	.04	.02	-.06	-.06	.01	.03
Sexual problems	-0.91	0.14	1%	25%	-^{a}	-^{a}	.05	.08*	-^{a}	-^{a}	.06	.05
Death of a friend	-0.91	0.65	0%	16%	-^{a}	-^{a}	.03	.03	-^{a}	-^{a}	.09	.04
Had an abortion (self or partner)	-0.91	0.31	0%	2%	-^{a}	-^{a}	.02	-.01	-^{a}	-^{a}	.07	.03
Got pregnant (self or partner)	-0.91	2.02	20%	1%	-.07	-.04	-^{a}	-^{a}	-.08*	-.04	-^{a}	-^{a}
Entered a new relationship (lasting at least 1 month)	-1.08	2.02	63%	7%	.03	.02	.10	.02	.03	.04	.20*	.10*
Death of a family member	-1.08	0.65	1%	62%	-^{a}	-^{a}	-.04	-.02	-^{a}	-^{a}	-.05	-.01
Parents broke up or divorced	-1.08	0.31	2%	4%	.13	.03	.01	.02	-.06	.00	-.01	.01
Got married	-1.24	2.02	27%	0%	-.08*	-.04	-^{a}	-^{a}	-.04	-.07	-^{a}	-^{a}

Note. N = 4,600 (only around 800 to 850 participants had no missing values on each life events variable). Results of 240 separate regression analyses that were

performed in 240 different true individual change models (Figure 4.2): 2 (narcissistic admiration vs. Mach) × 2 (positively vs. negatively evaluated) × 2 (event dummies vs. continuous event scores) models for each of the 30 life events. In all models, we controlled for initial level of self-esteem, gender, age, grade point average, figural and verbal reasoning, a dummy for whether the participant indicated having been born abroad, a dummy for whether the participant indicated that her/his parents had been born abroad, the education of the participants' parents, a dummy that indicated whether a participant was studying (for a comparison of results with and without control variables, see Chapter 4.6: Tables 4.13 and 4.14). Coefficients for effects that are significant at $p \leq .01$ are bold. DV = dependent variable; dum = event dummies; cont = continuous event scores; *b* = unstandardized regression coefficient; β = standardized regression coefficient.

[a] These events were experienced by fewer than 15 people, and thus, the estimated coefficients were not trustworthy.

$^{*}p \leq .05$, $^{**}p \leq .01$, $^{***}p \leq .001$.

Participants who changed their eating and sleeping habits in a positive way at least once over the 8-year time period showed stronger increases in narcissistic admiration than people who did not make positive changes in their eating habits (dummy: $b = .10$, $p = .007$) and sleeping habits (dummy: $b = .14$, $p = .003$; Figure 4.4), respectively. The two events also showed an effect when the frequency and intensity of the events was taken into account: The more often eating and sleeping habits were changed and the more these changes were evaluated as positive, the more narcissistic admiration scores increased (eating habits, continuous: $\beta = .11$, $p = .007$; sleeping habits, continuous: $\beta = .11$, $p = .001$). Similarly, people who broke off a romantic relationship and evaluated it as a positive event increased more in narcissistic admiration than people who did not experience a positively evaluated break-up (dummy: $b = .11$, $p = .008$; Figure 4.4). Again, there was also an effect when frequency and intensity were taken into account: The more often participants broke off a romantic relationship and the more these break-ups were evaluated as positive, the more narcissistic admiration scores increased (continuous: $\beta = .10$, $p = .004$). The effect of the event "Changed to another university/apprenticeship" was significant at $p \leq .01$ when frequency and intensity were taken into account: The more often a change to another university/apprenticeship took place and the more positively that change was evaluated, the more narcissistic admiration scores increased during early adulthood (continuous: $\beta = .11$, $p = .004$). Only one negatively evaluated life event was significantly ($p \leq .01$) related to changes in narcissistic admiration during early adulthood: Participants who failed an important exam at least once showed more increases in narcissistic admiration than people who did not fail an important exam (dummy: $b = .10$, $p = .007$; Figure 4.4). When the frequency and intensity of that event were taken into account, the effect was not significant (continuous: $\beta = .06$, $p = .12$).

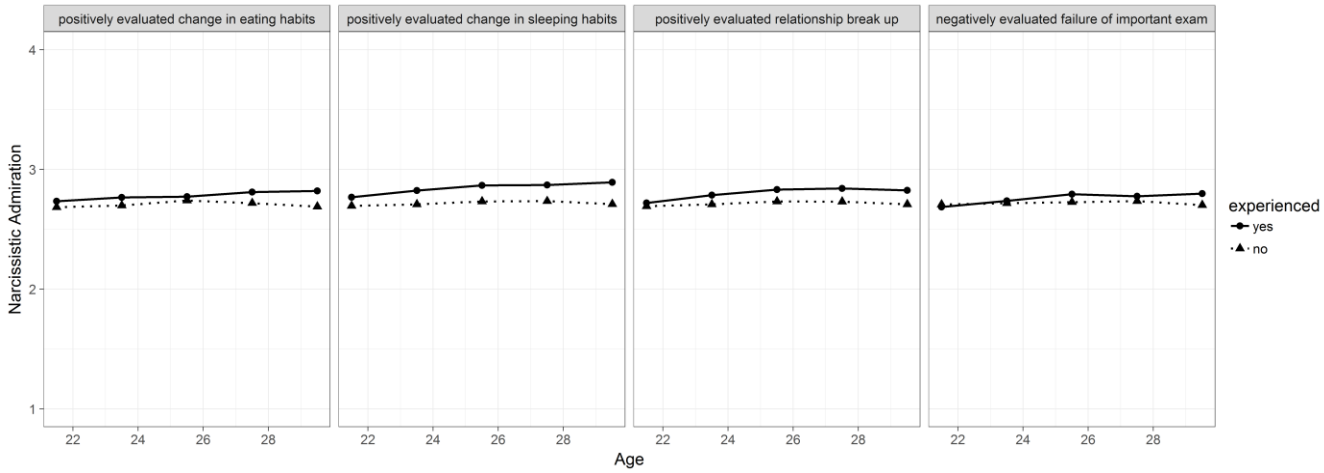

Figure 4.4. Mean-level development in narcissistic admiration for participants who did or did not experience certain life events during early adulthood. The response format of the narcissistic admiration items was a 4-point Likert-type scale ranging from 1 = *not true at all* to 4 = *completely true* (for item content, see Chapter 4.6: Table 4.5).

Regarding Mach, there was only one event that showed an effect that was significant at $p \leq .01$: starting a new job and evaluating it as a positive experience. People who experienced the positive start of a new job—91% of the participants did—decreased more in Mach than people who did not experience the positive start of a new job (dummy: $b = -.19$, $p = .005$). In fact, people who did not experience a positive start of a new job did not decrease in Mach over the 8-year period (Figure 4.5). Correspondingly, the more often and the more positively people evaluated the start of a new job, the more they decreased in Mach (continuous: $\beta = -.11$, $p = .002$; Table 4.3).

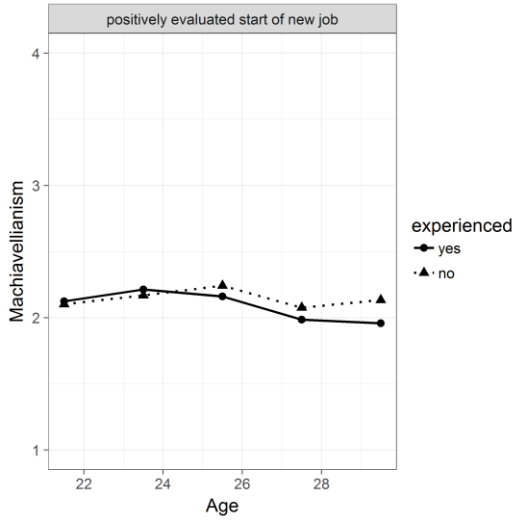

Figure 4.5. Mean-level development in Machiavellianism for participants who did or did not experience the start of a new job positively during early adulthood. The response format for the Machiavellianism items was a 4-point Likert-type scale ranging from 1 = *not true at all* to 4 = *completely true* (for item content, see Chapter 4.6: Table 4.5).

4.3.3.2.2 Agency and communion event scores

None of the agency and communion event scores showed a significant socialization effect on narcissistic admiration or on Mach (Table 4.2).

4.4 Discussion

The current study investigated (a) the mean-level development of narcissistic admiration and Mach during early adulthood and (b) how the development was associated with majoring in economics and the occurrence of several life events (socialization effects). In the following, we discuss the results separately for each of the two traits.

4.4.1 Narcissistic Admiration

In the two cohorts that we investigated, the mean levels of narcissistic admiration remained stable during early adulthood. Though this result is in line with two longitudinal studies (Carlson & Gjerde, 2009; Orth & Luciano, 2015), the finding seems to contradict cross-sectional research that found a negative correlation between total scores on the Narcissistic Personality Inventory and age (Foster et al., 2003; Hill & Roberts, 2012; Roberts, Edmonds, & Grijalva, 2010). One reason for this apparent contradiction could be that narcissistic admiration does not decrease until after early adulthood because the longitudinal studies covered only the age range of early adulthood, whereas the cross-sectional studies covered the age range from early adulthood to old age.

Furthermore, the lack of decrease in narcissistic admiration seems to contradict the assumption that narcissistic tendencies are "immature" and should thus decrease during the transition to adulthood (e.g., Roberts et al., 2010). Perhaps some narcissistic tendencies (e.g., narcissistic admiration) are less maladaptive than other tendencies (e.g., narcissistic rivalry) during early adulthood and thus only some narcissistic tendencies decrease during that time. In line with this reasoning, narcissistic admiration has positive or only very small negative associations with the three Big Five traits that increase with age according to the maturity principle (agreeableness, conscientious, and emotional stability; Back et al., 2013; Roberts et al., 2008). The assertive facet of the Narcissistic Personality Inventory, Leadership/Authority, was also the facet with the smallest correlation with age in prior research (Hill & Roberts, 2012).

Moreover, Hill and Roberts (2012) argued that assertiveness and an optimistic outlook—which are features of narcissistic admiration—might exhibit increases in young adulthood as people master the challenges that occur during this difficult phase. Also, developmental research has found a distinct increase in the assertiveness component of extraversion (Roberts et al., 2006), which may be quite similar to narcissistic admiration. Future studies might want to test this explanation by utilizing a more thorough and comprehensive measure of narcissism and investigating whether facets associated with narcissistic rivalry decrease during early adulthood.

The difference between narcissistic admiration and other facets of narcissism might also explain why we did not find socialization and selection effects of majoring in economics even though Bergman et al. (2012) found that economics students have higher scores on the Narcissistic Personality Inventory than psychology students. Majoring in economics might be related to some narcissistic tendencies assessed by the Narcissistic Personality Inventory (e.g., Entitlement/Exploitativeness) but not to narcissistic admiration.

The life events results suggest that several changes in life are associated with the development of narcissistic admiration. The associated changes were changes in eating and sleeping habits, changes to another university/apprenticeship, and the end of a romantic relationship. It was not immediately clear why changes in eating or sleeping habits are related to increases in narcissistic admiration. Given that effects were present only when the events were evaluated positively, we can assume that these changes in habits increased the health, physical appearance, quality of life, or the way people felt about themselves, which may have led to more assertiveness and more optimism. That said, the effect might also work in the other direction: An increase in narcissistic admiration may have led to better sleeping and eating habits.

The association of the positively evaluated event “broke off a romantic relationship” with increases in narcissistic admiration is better situated in existing narcissism research, which often focuses on narcissism and romantic relationships. Campbell, Brunell, and Finkel (2006) suggested—with reference to research on self-concept change in relationships and an unpublished longitudinal study—that people high in narcissism can shift from agentic to communal concerns when entering a romantic relationship. In line with such a shift would be a decrease in narcissistic admiration after these people “entered a new relationship.” Although we did not find evidence of such a decrease (Table 4.3), people seemed to increase in narcissistic admiration after the relationship was over, suggesting a post relationship shift from communal to

agentic concerns. It is noteworthy that such a shift—or at least the corresponding increase in narcissistic admiration—happened only when the break-up was evaluated positively. For the positive evaluators, the break-up might have been a relief, which might have increased the focus on agency or assertiveness and thus narcissistic admiration. Again, it could also work the other way around: Increases in narcissistic admiration lead to positive break-ups of (dissatisfying) romantic relationships.

Finally, the association of a negatively evaluated failure on an important exam and increases in narcissistic admiration is in line with psychoanalytic theories that argue that unpleasant self-related experiences lead to a defensive inflation of self-esteem and self-centeredness (e.g., Kernberg, 1975; Pulver, 1970) and theories suggesting that vulnerability is at the bottom of grandiose narcissism (e.g., Morf & Rhodewalt, 2001; Robins et al., 2001). That said, other negative experiences (Tables 4.2 and 4.3) and stressful life events (Orth & Luciano, 2015) have not been found to be significantly related to changes in narcissistic admiration and narcissism, respectively.

The selection effects we found indicated that people high in narcissistic admiration at age 21.5 experienced more negative agentic (and communal) life events in the subsequent years than people low in narcissistic admiration (Table 4.2). These findings are in line with research by Orth and Luciano (2015) who found that young adults high in narcissism experienced subsequently more stressful life events than young adults low in narcissism. The more frequent occurrence of negative life events probably has to do with tendencies related to narcissism such as high approach and low avoidance motivation (e.g., Foster & Trimm, 2008), impulsivity (Vazire & Funder, 2006), and risky behavior (Foster, Shenesey, & Goff, 2009).

4.4.2 Machiavellianism

The gradual decrease in mean Mach levels in both cohorts is consistent with the maturity principle. The maturity principle states, among other things, that disagreeable tendencies decrease with age (e.g., Roberts et al., 2008; Specht et al., 2014): Commitments to family, friends, social and occupational roles, and/or genetic factors should lead to a decrease in antisocial, disagreeable, and antagonistic tendencies in early adulthood (e.g., Bleidorn et al., 2013). Occupational roles seem to be the driving force behind this decrease in Mach in early adulthood given that only people who started a new job and evaluated it positively decreased in

Mach (Figure 4.5). In other words, successfully mastering occupational roles may contribute to decreases in Mach.

Surprisingly, we found only one significant socialization effect for Mach. One reason could be the focus of the current study on long-lasting socialization effects: We related the events to changes in Mach over an 8-year time period. Some life events might be related to a temporary increase or decrease in Mach, but the level of Mach might rebound several weeks after the event happened. Fraley and Roberts (2014) showed that events such as a relationship break-up increased, for example, neuroticism levels, but personality bounced back after several weeks (see also Lucas, 2005). Momentary short-term increases or decreases might be more frequent than long-lasting socialization effects.

Partly supporting our hypotheses about majoring in economics, we found selection but not socialization effects for studying economics. The selection effects explain why previous studies found higher levels of Mach in economics students (McLean & Jones, 1992; Skinner, 1981; but see also Li-Ping Tang et al., 2008) and are in accordance with the low communal and high agentic motivation of people high in Mach and their motivation to achieve financial success (McHoskey, 1999).

Finally, Mach at age 21.5 negatively predicted the subsequent occurrence of positive communal life events. Yet, it remains unclear whether people high in Mach experienced communal life events less often or whether they less often evaluated these events as positive than people low in Mach.

4.4.3 Limitations and Future Directions

Like many large-scale longitudinal studies, a potential limitation of our research was its reliance on self-reports: The validity of our findings stands or falls with the willingness and ability of our participants to respond objectively. That said, most of the life events we assessed are “objective”: They are externally verifiable and thus too salient to be misremembered (e.g., getting married; Magnus, Diener, Fujita, & Pavot, 1993). Finally, self-report instruments are the most common and most validated approach for assessing personality traits such as narcissistic admiration and Mach. Nevertheless, future research might want to measure narcissism, Mach, and life events with more than one method (e.g., via self-reports and other reports) in order to rule out self-report biases.

Because this study was the first to examine changes in narcissistic admiration and Mach over this long of a time period during early adulthood, the study was naturally largely exploratory. Similar future longitudinal research could endeavor to test the hypotheses from our study to determine whether the types of experiences associated with changes in narcissism and Mach can be replicated. In particular, future research might want to replicate the interesting finding that failing to experience the positive start of a new job hampers a decrease in Mach.

Another reason why a replication of the results is warranted is our use of nontraditional measures of narcissistic admiration and Mach. That said, we validated the questionnaires that were used in three studies (see Chapter 4.6: Text 4.1 and Tables 4.6 to 4.8).

Finally, although we used the term socialization effect in this study in accordance with previous research on personality development, our data and analyses did not allow us to make causal claims. We do not know whether life events caused changes in narcissistic admiration or Mach, changes in narcissistic admiration or Mach caused life events, or both were caused by a third variable not controlled for in the current study.

4.4.4 Conclusion

Clearly, compared with longitudinal research on the Big Five during early adulthood, longitudinal research on narcissism and Mach is only just beginning. The current study with its two large longitudinal data sets delivers one of the initial pictures of mean-level changes during early adulthood. This picture shows that narcissistic admiration does not change in early adulthood, whereas Mach gradually decreases. The life events analyses supplemented this picture by identifying events that potentially trigger long-lasting changes in narcissistic admiration and Mach.

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4.6 Supplemental Material

Text 4.1

Validation of the Narcissism and Machiavellianism Items used in the TOSCA Study

The convergent and divergent validity of the narcissism and Machiavellianism (Mach) items used in the TOSCA study (Chapter 4.6: Table 4.5) were assessed in three samples. Sample 1 was a US sample recruited online via Amazon Mechanical Turk in March 2015. Sample 2 was an international sample—60% of the people were from the US—recruited online via the site yourpersonality.net on which people can fill out personality questionnaires to receive feedback about their personality. Sample 3 was recruited at a German university in a lecture for people who are studying to become a teacher. All three samples filled out a questionnaire that contained the TOSCA narcissism and TOSCA Machiavellianism items and items from other self-report scales; the other scales varied from sample to sample. The first two samples filled out their questionnaire online and in English. The third sample filled out their questionnaire in a paper-pencil format and in German. The correlations between the two TOSCA scales and all relevant other scales will be reported and discussed in the following.

Results for Sample 1 (Amazon Mechanical Turk). The results for Sample 1 can be found in Table 4.6. TOSCA narcissism was strongly correlated with the NPI total scale: manifest[12] r = .54; latent[13] r = .66 (both p-values ≤ .001). However, unexpectedly, TOSCA narcissism was also

[12] Manifest correlations: bivariate Pearson correlation between the average item scores of two scales.

[13] Latent correlations: Unidimensional models were fit to the items of each of the two scales, and the latent variables were allowed to correlate in a structural equation model. For this analysis, we used the R package lavaan (Rosseel, 2012) version 0.5-18.

strongly correlated with self-esteem: manifest r = .63; latent r = .72 (both p-values ≤ .001. This finding is in contrast to the correlation between TOSCA narcissism and self-esteem found in the two TOSCA cohorts: manifest r = .31 (p ≤ .001) at the first measurement occasion for the TOSCA-2006 cohort (N = 4,715) and manifest r = .26 (p ≤ .001) at the second measurement occasion for the TOSCA-2002 cohort (N = 2,287; TOSCA narcissism was not assessed at Time 1 in the TOSCA-2002 cohort). In both cohorts, self-esteem was assessed with three items from a German version of the Rosenberg Self-Esteem Scale (Rosenberg, 1965; see also Rieger, Göllner, Trautwein, & Roberts, 2015).

TOSCA Mach was strongly correlated with the MACH IV scale (Christie & Geis, 1970): manifest r = .63; latent r = .80 (both p-values ≤ .001). TOSCA Mach was also strongly correlated with the subscales from the Psychopathy scale SRP-III (Williams, Nathanson, & Paulhus, 2003), especially with the Interpersonal Manipulation subscale from the SRP-III (Table 4.5). Established Mach scales are often highly correlated with this subscale from the SRP-III (e.g., Jones & Figueredo, 2013). Similarly, MACH IV was also strongly correlated with the SRP-III subscales in Sample 1 (Table 4.5).

Results for Sample 2 (yourpersonality.net). The results for Sample 2 can be found in Table 4.7. In this sample, TOSCA narcissism was most strongly correlated with the Narcissistic Admiration scale from the Narcissistic Admiration and Rivalry Questionnaire: manifest r = .71; latent r = .83 (both p-values ≤ .001). TOSCA Mach was strongly correlated with Narcissistic Rivalry: manifest r = .63; latent r = .70 (both p-values ≤ .001). This finding is in line with previous research that also found strong associations between the Mach IV total score and Narcissistic Rivalry (Back et al., 2013).

Results for Sample 3 (German university). The results for Sample 3 can be found in Table 4.8. Similar to what was found in Sample 2, the TOSCA narcissism scale was strongly correlated with the Narcissistic Admiration scale from the Narcissistic Admiration and Rivalry Questionnaire: manifest r = .72; latent r = .81 (both p-values ≤ .001). In contrast to the results from Sample 1, the TOSCA narcissism scale was only moderately strongly correlated with self-esteem: manifest r = .31; latent r = .31 (both p-values ≤ .01). The strength of the correlation between narcissistic admiration and self-esteem in Sample 2 was similar to the strength reported in previous research (e.g., Back et al., 2013). TOSCA Mach was strongly correlated with the Machiavellianism subscale from the Short Dark Triad scale: manifest r = .59; latent r = .76 (both p-values ≤ .001).

Conclusion. On the basis of the correlations in the three samples, we think the TOSCA narcissism items show the greatest overlap with narcissistic admiration, and the TOSCA Machiavellianism items show the greatest overlap with Machiavellianism.

Table 4.4

Attrition Effects and Retention Rates

	TOSCA-2006 Cohort (target = 6,177)						TOSCA-2002 Cohort (target = 5,901)				
	N	NA T1	Mach T1	% Female	GPA		*N*	NA T1	Mach T1	% Female	GPA
T1	4,944	2.81	2.29	0.56	2.37		4,633	-	-	0.55	2.42
T2	2,854	2.80	2.24	0.61	2.27		2,289	2.70	2.14	0.62	2.31
T3	2,164	2.80	2.24	0.61	2.24		1,890	2.69	2.13	0.64	2.30
T4	1,902	2.80	2.24	0.60	2.24		1,851	2.71	2.13	0.63	2.27
T5	-	-	-	-	-		1,668	2.69	2.12	0.63	2.29
T6	-	-	-	-	-		1,399	2.70	2.14	0.46	2.30
Continuers	2,838	2.80	2.24	0.61	2.27		2,572	2.70	2.14	0.61	2.32
Dropouts	2,106	2.82	2.35	0.49	2.52		2,061	-	-	0.47	2.55
Cohen's *d*	-	0.03	0.18	-	0.40			-	-	-	0.36

Note. Dropouts participated only at the first measurement occasion; continuers participated at least one more time. NA = Narcissistic Admiration; Mach = Machiavellianism.

Table 4.5

Narcissism and Machiavellianism Items, Means, Standard Deviations, and Item-Total Correlations from the First Wave of the TOSCA-2006 Cohort

Item no.	Item content		*M*	*SD*	r_{it}
	German	English			
Narcissistic admiration					
1	Insgesamt halte ich mich für einen eher außergewöhnlichen Menschen.	All in all, I think I am a rather exceptional person.	2.68	0.75	.54
2	Ich habe viele sehr spezielle Fähigkeiten.	I have many special abilities.	2.96	0.74	.66
3	Ich bin sicherlich ein Mensch mit ganz besonderen Begabungen.	I am an exceptionally gifted person.	2.83	0.75	.74
4	Von mir könnten viele Menschen sehr viel lernen.	Many people could learn a great deal from me.	2.58	0.67	.53
5	Ich bin ein Mensch mit vielen besonderen Eigenschaften.	I am a person with many special qualities.	2.90	0.70	.75
6	Ich habe sicherlich die Voraussetzungen dafür, etwas Besonderes zu leisten.	I am capable of accomplishing something special.	2.96	0.65	.65
Machiavellianism					
1	Was das Berufsleben anbetrifft, ist es oft nicht so wichtig, *wie* man gewinnt, sondern *dass* man gewinnt.	In professional life, it's often less important how you win, but rather that you win.	2.74	0.90	.51
2	Wer etwas im Leben erreichen will, muss unter Umständen auch „über Leichen gehen".	In order to get ahead, you need to stop at nothing in some circumstances.	1.94	0.93	.65
3	Egal ob man es mag oder nicht: Manchmal muss man die „Ellbogen einsetzen", um etwas zu erreichen.	Whether you like it or not: Sometimes you have to hurt other people to achieve something.	2.72	0.83	.56
4	Um eine gute Idee durchzusetzen, sollte man - wenn nötig - auch zu weniger feinen Mitteln greifen.	To push through a good idea, it's sometimes necessary to cheat.	2.05	0.79	.65
5	Fairness ist zwar wichtig, aber manchmal hilft sie nicht weiter.	Sometimes behaving ethically is not useful.	2.34	0.84	.57
6	In vielen Situationen heiligt der Zweck die Mittel.	In many situations, the end justifies the means.	2.21	0.79	.63

Note. Narcissism: *N* = 4,882; Machiavellianism: *N* = 4,875. The response format for the narcissistic admiration and Mach items was a 4-point Likert-type scale ranging from 1 = *not true at all* to 4 = *completely true*. r_{it} = item-total correlation.

Table 4.6

Correlations from the Validation Study of the TOSCA Narcissism and Machiavellianism Items in a US-American Sample Recruited via mTurk

	TOSCA Narc	TOSCA Mach	NPI	NPI L/A	NPI GE	NPI E/E	MACH	MACH Tactics	MACH Views	MACH*	SRP	SRP IPM	SRP CA	SRP. ELS	SRP ASB	RSE
TOSCA Narc	.91															
TOSCA Mach	.11	.84														
NPI	.54 (.66)	.25	.91													
NPI L/A	.53 (.65)	.17	.89	.85												
NPI GE	.37	.19	.78	.57	.82											
NPI E/E	.15	.33	.56	.39	.3	.55										
MACH	-.16	.63 (.80)	.14	.07	.07	.35	.84									
MACH Tactics	-.14	.60 (.79)	.15	.08	.11	.34	.90	.77								
MACH Views	-.14	.51 (.72)	.09	.04	.01	.27	.87	.58	.75							
MACH*	-.13	.62 (.88)	.10	.06	.04	.29	.87	.77	.79	.59						
SRP	.07	.61	.37	.28	.28	.43	.68	.60	.59	.62	.93					
SRP IPM	.07	.63 (.78)	.34	.27	.24	.41	.77	.74	.62	.70	.82	.86				
SRP CA	.01	.53	.25	.18	.14	.37	.63	.55	.55	.55	.83	.64	.81			
SRP ELS	.10	.43	.34	.29	.29	.27	.47	.37	.44	.47	.83	.56	.54	.83		
SRP ASB	.04	.37	.26	.16	.22	.36	.35	.29	.32	.29	.77	.44	.52	.55	.82	
RSE	.63 (.72)	-.17	.26	.28	.19	-.02	-.38	-.29	-.37	-.31	-.24	-.22	-.20	-.14	-.20	.93

Note. N = 303 - 304. Cronbach's alpha values are displayed on the diagonal. The correlation coefficients outside the parentheses are bivariate Pearson correlations between the average item scores from two scales. In parentheses, we present latent correlations that we obtained by fitting unidimensional models to each of the two scales and correlating the latent variables in a structural equation model using the R package lavaan (Rosseel, 2012) version 0.5-18. TOSCA Narc = narcissism scale used in TOSCA; TOSCA Mach = Machiavellianism scale used in TOSCA; NPI = Narcissistic Personality Inventory (Raskin & Hall, 1979); NPI L/A = Leadership/Authority facet from the Ackerman et al. (2011) solution; NPI GE = Grandiose Exhibitionism facet from the Ackerman et al. (2011) solution; NPI E/E = Entitlement/Exploitativeness facet from the Ackerman et al. (2011) solution; MACH = MACH IV Scale (Christie & Geis, 1970); MACH* = MACH IV scale trimmed (Rauthmann, 2013); SRP = Self-Report Psychopathy Scale SRP-III (Williams, Nathanson, & Paulhus, 2003); SRO IPM = SRP subscale interpersonal manipulation; SRP CA = SRP subscale Callous Affect; SRP ELS = SRP subscale Erratic Life Style; SRP ASB = SRP subscale Anti-Social Behavior; RSE = Rosenberg Self-Esteem Scale (Rosenberg, 1965).

Table 4.7

Correlation Table for Validation Study of TOSCA Narcissism and Machiavellianism Items in Sample 2

	TOSCA Narc	**TOSCA Mach**	**NPI**	**NPI L/A**	**NPI GE**	**NPI E/E**	**NARQ ADM**	**NARQ RIV**
TOSCA Narc	.89							
TOSCA Mach	.31	.89						
NPI	.63	.57	.90					
NPI L/A	.62	.39	.86	.80				
NPI GE	.44	.45	.78	.51	.78			
NPI E/E	.30	.56	.65	.44	.43	.60		
NARQ ADM	.71 (.83)	.49	.78	.69	.62	.43	.87	
NARQ RIV	.38	.63 (.70)	.61	.41	.49	.62	.57	.87

Note. $N = 667$. Cronbach's alpha are displayed on the diagonal. The correlation coefficients outside of brackets are bivariate Pearson correlations between the average item scores of two scales. In brackets, latent correlations are presented that we obtained fitting unidimensional models to each of the two scales and correlating the latent variables in a structural equation model, using the R package lavaan (Rosseel, 2012) version 0.5-18. TOSCA Narc = narcissism scale used in TOSCA; TOSCA Mach = Machiavellianism scale used in TOSCA; NPI = Narcissistic Personality Inventory (Raskin & Hall, 1979); NPI L/A = Leadership/Authority facet of Ackerman et al. (2011) solution; NPI GE = Grandiose Exhibitionism facet of Ackerman et al. (2011) solution; NPI E/E = Entitlement/Exploitativeness facet of Ackerman et al. (2011) solution; ADM = Narcissistic Admiration Scale from the Narcissistic Admiration and Rivalry Questionnaire (NARQ; Back et al., 2013); ADM grand = Grandiosity facet of the Admiration Scale of the NARQ; RIV = Rivalry Scale of the NARQ.

Table 4.8

Correlation Table for Validation Study of TOSCA Narcissism and Machiavellianism Items in a German Sample

	TOSCA Narc	**TOSCA Mach**	**SD3 Narc**	**SD3 Mach**	**SD3 Psych**	**NARQ ADM**	**NARQ RIV**	**RSE**	**B5 EXTRA**	**B5 CONSC**	**B5 NEURO**	**B5 AGREE**	**B5 OPEN**
TOSCA Narc	.89												
TOSCA Mach	.28	.83											
SD3 Narc	.56 (.73)	.33	.63										
SD3 Mach	.15	.59 (.76)	.34	.75									
SD3 Psych	.27	.39 (.63)	.43	.45	.61								
NARQ ADM	.72 (.81)	.38	.74	.30	.48	.82							
NARQ RIV	.11	.44	.32	.50	.51	.33	.79						
RSE	.31 (.31)	.04	.27	.01	.00	.39	-.19	.88					
B5 Extra	.38	.03	.52	-.03	.21	.44	-.06	.31	.85				
B5 Consc	.08	-.07	-.02	-.09	-.24	.01	-.16	.12	.10	.71			
B5 Neuro	-.27	.05	-.13	.10	.08	-.20	.31	-.58	-.25	-.18	.81		
B5 Agree	-.03	-.35	-.18	-.31	-.51	-.13	-.58	.23	.07	.25	-.38	.70	
B5 Open	.34	-.05	.26	.03	.08	.23	-.12	.05	.37	.06	-.18	.16	.81

Note. $N = 158$. Cronbach's alpha are displayed on the diagonal. The correlation coefficients outside of brackets are bivariate Pearson correlations between the average item scores of two scales. In brackets, latent correlations are presented that we obtained fitting unidimensional models to each of the two scales and correlating the latent variables in a structural equation model, using the R package lavaan (Rosseel, 2012) version 0.5-18. SD3 = a German translation of the Short Dark Triad (Jones & Paulhus, 2014); TOSCA Narc = narcissism scale used in TOSCA; TOSCA Mach = Machiavellianism scale used in TOSCA; RSE = German 10-item version of the Rosenberg Self-Esteem Scale (Ferring & Filipp, 1996); ADM = Narcissistic Admiration Scale from the Narcissistic Admiration and Rivalry Questionnaire (NARQ; Back et al., 2013); ADM grand = Grandiosity facet of the Admiration Scale of the NARQ; RIV = Rivalry Scale of the NARQ; Extra = Extraversion of the German BFI-42 (Lang, Luedtke, Asendorpf, 2001); Consc = Conscientiousness of the German BFI-42; Neuro = Neuroticism of the German BFI-42; Agree = Agreeableness of the German BFI-42; Open = Openness to Experience of the German BFI-42.

Table 4.9

Comparison of Results with and Without Control Variables: Selection and Socialization Effects for Studying Economics (TOSCA-2006 cohort)

	Narcissistic Admiration			**Machiavellianism**	
	w/o control variables	with control variables		w/o control variables	with control variables
Selection Effects (Regression of Study Major Choice on Initial Level of NA or Mach)					
Initial Level of NA/Mach	**1.02**	**0.92**		**2.07*****	**2.13*****
Self-Esteem		0.84			0.81*
Grade Point Average		0.92			0.82
Figural Reasoning		0.96			0.96
Verbal Reasoning		0.91			0.89
Education of Parents		0.96			0.97
Age		0.95			0.96
Born Abroad		0.81			0.73
Parents Born Abroad		0.92			0.92
Vocational High School		3.97***			3.78***
Gender		0.83			1.12
Socialization Effects (Regression of Change in NA or Mach on Study Major)					
Initial Level of NA/Mach	-0.43***	-0.45***		-0.45***	-0.5***
Economics Major	**-0.02**	**-0.01**		**0.05**	**0.06**
Self-Esteem		-0.04			0.00
Grade Point Average		0.01			0.04
Figural Reasoning		0			0.02
Verbal Reasoning		-0.02			-0.03
Education of Parents		0.02*			-0.01
Age		0.00			0.00
Born Abroad		0.07			0.11
Parents Born Abroad		-0.01			-0.01
Vocational High School		-0.04			-0.02
Gender		-0.03			-0.19***

Note. N = 1,950. Unstandardized regression coefficients from eight separate regression analyses that were performed within four different true individual change models (Figure 1). In all models, we controlled for initial level of self-esteem, gender, age, grade point average, participant's figural and verbal reasoning, a dummy for whether the participant indicated to be born abroad, a dummy for whether the participant indicated that her/his parents were born abroad, the education of the parents, a dummy as control variable that indicated whether a participant was attending a vocational high school focused on economics. In the socialization effects models, we additionally controlled for the initial level of narcissistic admiration or initial level of Machiavellianism (depending on the dependent variable). The results for the tested selection and socialization effects are bold. NA = narcissistic admiration; Mach = Machiavellianism.

* $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Table 4.10

Selection effects of Narcissistic Admiration on Event Dummies and Continuous Event Scores

	Expert Rating		Base rate (dum = 1)		Event **positively** evaluated				Event **negatively** evaluated			
					dum *OR*		cont β		dum *OR*		cont β	
Event	Agency	Comm-union	positive	negative	w/o cvs	with cvs	w/o cvs	with cvs	w/o cvs	with cvs	w/o cvs	with cvs
Started a new job	1.67	-0.89	91%	7%	1.09	1.03	.11**	.10**	0.66	0.97	-.02	.03
Won an academic award or prize	1.67	-1.40	45%	1%	1.09	1.00	.09*	.07	-[a]	-[a]	-[a]	-[a]
Got promoted at work	1.51	-0.89	41%	0%	0.98	0.84	.02	-.01	-[a]	-[a]	-[a]	-[a]
Began regular work after graduation	1.51	-0.38	51%	3%	0.87	0.80	.03	.02	1.87	3.30*	.05	.09*
Increased working hours	1.34	-1.06	21%	44%	1.02	0.89	.04	.02	1.35	1.48*	.11**	.12**
Change in financial situation (much better or worse)	1.18	-0.89	84%	29%	1.31	0.98	.04	-.01	1.59*	2.56**	.11**	.19**
Quit a job / Lay-off	1.18	-0.38	5%	19%	1.41	1.47	.04	.05	1.2	1.59	.04	.09*
Changed major/stopped university studies/apprenticeship	1.02	-0.89	17%	4%	1.26	1.57	.05	.08*	1.97	3.12*	.04	.07
Failed an important exam	0.86	-1.06	8%	29%	0.86	0.76	-.01	-.04	0.9	0.83	.01	.02
Changed to another university/apprenticeship	0.86	-0.38	22%	3%	1.74**	1.77**	.08*	.08*	0.84	0.89	-.04	-.02
Went abroad	0.38	-0.03	95%	2%	0.83	0.62	.04	-.01	4.04*	4.61**	.07*	.09**
Moved out of home	0.05	0.48	54%	4%	0.86	0.91	-.01	.02	2.1	3.08*	.03	.07
Borrowed a large amount of money (more than €1,000)	0.05	-0.72	8%	15%	1.03	0.78	.02	-.01	1.26	1.54	.07*	.09**
Own injury or illness	-0.27	-0.38	3%	54%	2.64	2.55	.08*	.08	0.99	1.13	-.02	.02
Quit smoking	-0.27	-0.72	17%	1%	1.18	1.27	.03	.05	-[a]	-[a]	-[a]	-[a]

Change in eating habits (much more or less food intake)		-0.43	-0.89		34%	26%		1.27	1.32		.07	.06		1.62*	2.29**		.06	.13**
Convicted for a minor offence (fare dodging, speeding, etc.)		-0.59	-0.55		4%	24%		2.71*	2.62		.08*	.07		1.1	1.23		.05	.07
Started psychotherapy		-0.59	0.48		13%	2%		0.86	1.35		-.03	.03		0.68	1.21		-.03	-.01
Broke off a relationship with a boyfriend/girlfriend		-0.75	1.16		18%	48%		1.13	1.29		.03	.05		1.03	1.19		.02	.07
Illness or injury of a family member		-0.75	1.16		2%	77%		1.56	1.88		.04	.05		1.6*	1.78*		.06	.09*
Illness or injury of a friend		-0.75	1.16		1%	45%		-[a]	-[a]		-[a]	-[a]		1.52*	1.71**		.10**	.13**
Change in sleeping habits (much more or less sleep)		-0.75	-1.06		15%	39%		1.36	1.31		.02	.02		1.43*	1.78**		.06	.11**
Sexual problems		-0.91	0.14		1%	25%		-[a]	-[a]		-[a]	-[a]		1.15	1.41		.01	.06
Death of a friend		-0.91	0.65		0%	16%		-[a]	-[a]		-[a]	-[a]		2.06**	2.32**		.10**	.11**
Had an abortion (self or partner)		-0.91	0.31		0%	2%		-[a]	-[a]		-[a]	-[a]		2.74	3.09		.06*	.07*
Got pregnant (self or partner)		-0.91	2.02		20%	1%		1.00	0.97		.01	.02		-[a]	-[a]		-[a]	-[a]
Entered a new relationship (lasting at least 1 month)		-1.08	2.02		63%	7%		1.45*	1.54*		.08*	.08*		0.96	1.07		-.01	.01
Death of a family member		-1.08	0.65		1%	62%		-[a]	-[a]		-[a]	-[a]		1.32	1.38		.00	.00
Parents broke up or divorced		-1.08	0.31		2%	4%		0.79	1.02		.01	.02		1	1.24		.01	.03
Got married		-1.24	2.02		27%	0%		0.76	0.66*		-.07	-.10**		-[a]	-[a]		-[a]	-[a]

Note. *N* without control variables = 2,571 (narcissistic admiration) and 2,572 (Machiavellianism); *N* with control variables = 4,600. Results of 240 separate regression analyses that were performed within 240 different true individual change models (Figure 1): 2 (positively vs. negatively evaluated) × 2 (event dummies vs. continuous event scores) × 2 (without vs. with control variables) models for each of the 30 life events. In the models with control variables, we controlled for initial level of self-esteem, gender, age, grade point average, figural and verbal reasoning, a dummy for whether the participant indicated having been born abroad, a dummy for whether the participant indicated that her/his parents had been born abroad, the education of the participants' parents, a dummy that indicated whether a participant was studying. DV = dependent variable; dum = event dummies; cont = continuous event scores; *b* = unstandardized regression coefficient; β = standardized regression coefficient; *OR* = Odds Ratio; cvs = control variables.

[a] These events were experienced by less than 15 people and thus the results were not trustworthy.

$^{*}p \leq .05$. $^{**}p \leq .01$. $^{***}p \leq .001$.

Table 4.11

Selection effects of Machiavellianism on Event Dummies and Continuous Event Scores

	Expert Rating		Base rate (dum = 1)		Event **positively** evaluated				Event **negatively** evaluated			
					dum *OR*		cont β		dum *OR*		cont β	
Event	Agency	Comm -union	positive	negative	w/o cvs	with cvs	w/o cvs	with cvs	w/o cvs	with cvs	w/o cvs	with cvs
Started a new job	1.67	-0.89	91%	7%	1.07	1.14	-.01	.00	1.1	1.28	.00	.01
Won an academic award or prize	1.67	-1.40	45%	1%	1.43*	1.80**	.08	.12*	-[a]	-[a]	-[a]	-[a]
Got promoted at work	1.51	-0.89	41%	0%	1.06	1.08	.06	.07	-[a]	-[a]	-[a]	-[a]
Began regular work after graduation	1.51	-0.38	51%	3%	0.88	0.94	-.04	-.03	0.85	0.62	-.01	-.03
Increased working hours	1.34	-1.06	21%	44%	0.86	0.83	.00	-.01	0.75	0.8	-.02	.00
Change in financial situation (much better or worse)	1.18	-0.89	84%	29%	0.87	0.95	.04	.05	1.05	0.96	.03	.01
Quit a job / Lay-off	1.18	-0.38	5%	19%	1.15	1.14	-.01	-.01	0.79	0.63	-.04	-.08
Changed major/stopped university studies/apprenticeship	1.02	-0.89	17%	4%	1.41	1.24	.06	.04	2.45*	1.58	.09*	.06
Failed an important exam	0.86	-1.06	8%	29%	0.68	0.70	-.05	-.05	1.35	1	.07	.00
Changed to another university/apprenticeship	0.86	-0.38	22%	3%	1.13	1.13	.02	.04	1.48	1.17	.04	.03
Went abroad	0.38	-0.03	95%	2%	1.12	1.14	-.04	-.01	0.94	1.13	.02	.03
Moved out of home	0.05	0.48	54%	4%	1.26	1.08	.06	.03	1.03	0.95	.01	.02
Borrowed a large amount of money (more than €1,000)	0.05	-0.72	8%	15%	0.98	0.89	.05	.03	0.68	0.53*	-.08*	-.11*
Own injury or illness	-0.27	-0.38	3%	54%	0.45	0.45	-.08	-.08	1.11	1.05	.04	.05
Quit smoking	-0.27	-0.72	17%	1%	1.02	0.88	-.01	-.03	-[a]	-[a]	-[a]	-[a]
Change in eating habits (much more or less food intake)	-0.43	-0.89	34%	26%	1.02	0.96	-.02	-.03	0.97	1.02	.00	.01

Convicted for a minor offence (fare dodging, speeding, etc.)		-0.59	-0.55		4%	24%		1.84	1.21		.00	-.04		1.17	1.13		.04	.03
Started psychotherapy		-0.59	0.48		13%	2%		0.69	0.75		-.08	-.07		0.78	1.07		-.02	.00
Broke off a relationship with a boyfriend/girlfriend		-0.75	1.16		18%	48%		0.93	0.98		-.05	-.04		1.45*	1.39		.08*	.08
Illness or injury of a family member		-0.75	1.16		2%	77%		0.76	0.56		.00	-.02		1.44	1.59*		.04	.10*
Illness or injury of a friend		-0.75	1.16		1%	45%		-[a]	-[a]		-[a]	-[a]		0.81	0.86		-.01	.01
Change in sleeping habits (much more or less sleep)		-0.75	-1.06		15%	39%		1.09	1.00		.05	.04		1.1	1.15		.01	.02
Sexual problems		-0.91	0.14		1%	25%		-[a]	-[a]		-[a]	-[a]		1.13	1.17		-.02	-.01
Death of a friend		-0.91	0.65		0%	16%		-[a]	-[a]		-[a]	-[a]		1.56	1.64		.04	.06
Had an abortion (self or partner)		-0.91	0.31		0%	2%		-[a]	-[a]		-[a]	-[a]		0.89	0.75		-.02	-.02
Got pregnant (self or partner)		-0.91	2.02		20%	1%		0.52**	0.58*		-.14***	-.12**		-[a]	-[a]		-[a]	-[a]
Entered a new relationship (lasting at least 1 month)		-1.08	2.02		63%	7%		1.02	0.97		.01	.00		1.01	1.03		.00	.00
Death of a family member		-1.08	0.65		1%	62%		-[a]	-[a]		-[a]	-[a]		1.23	1.36		.06	.07
Parents broke up or divorced		-1.08	0.31		2%	4%		0.63	0.75		-.04	-.03		0.6	0.52		-.04	-.06
Got married		-1.24	2.02		27%	0%		0.56**	0.57*		-.13***	-.12**		-[a]	-[a]		-[a]	-[a]

Note. *N* without control variables = 2,571 (narcissistic admiration) and 2,572 (Machiavellianism); *N* with control variables = 4,600. Results of 240 separate regression analyses that were performed within 240 different true individual change models (Figure 1): 2 (positively vs. negatively evaluated) × 2 (event dummies vs. continuous event scores) × 2 (without vs. with control variables) models for each of the 30 life events. In the models with control variables, we controlled for initial level of self-esteem, gender, age, grade point average, figural and verbal reasoning, a dummy for whether the participant indicated having been born abroad, a dummy for whether the participant indicated that her/his parents had been born abroad, the education of the participants' parents, a dummy that indicated whether a participant was studying. DV = dependent variable; dum = event dummies; cont = continuous event scores; *b* = unstandardized regression coefficient; β = standardized regression coefficient; *OR* = Odds Ratio; cvs = control variables.

[a] These events were experienced by less than 15 people and thus the results were not trustworthy.

* $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Table 4.12

Comparison of Results with and Without Control Variables: Socialization and Selection Effects for Aggregated Event Scores (without control variables)

	Socialization Effect					***Selection Effect***			
	DV = Change in Narcissistic Admiration		DV = Change in Machiavellianism			IV = Initial Level of Narcissistic Admiration		IV = Initial Level of Machiavellianism	
Event score	w/o cvs	with cvs	w/o cvs	with cvs		w/o cvs	with cvs	w/o cvs	with cvs
Positive agency	.09	.08	-.07	-.05		.10	.07	.08	.11
Negative agency	.08	.08	.10	.09		.11*	.16**	-.02	-.04
Positive communion	-.05	-.04	-.08	-.07		.00	.02	-.15**	-.16**
Negative communion	.02	.02	.03	.07		.10	.13*	.05	.08

Note. N without control variables = 2,571 (narcissistic admiration) and 2,572 (Machiavellianism); *N* with control variables = 4,600. Standardized regression coefficients from 32 separate regression analyses that were performed in 16 different true individual change models (Figure 1). In the models with control variables, we controlled for initial level of self-esteem, gender, age, grade point average, figural and verbal reasoning, a dummy for whether the participant indicated having been born abroad, a dummy for whether the participant indicated that her/his parents had been born abroad, the education of the parents, and a dummy that indicated whether a participant was studying. DV = dependent variable; IV = independent variable; cvs = control variables.

Table 4.13

*Comparison of Results with and Without Control Variables: Socialization effects of 30 Life Events on Changes in **Narcissistic Admiration***

	Expert Rating		Base rate (dum = 1)		Event **positively** evaluated				Event **negatively** evaluated			
					dum *b*		cont β		dum *b*		cont β	
Event	Agency	Comm-union	positive	negative	w/o cvs	with cvs	w/o cvs	with cvs	w/o cvs	with cvs	w/o cvs	with cvs
Started a new job	1.67	-0.89	91%	7%	.02	.03	.06	.06	.00	.01	-.01	.00
Won an academic award or prize	1.67	-1.40	45%	1%	.03	.04	.06	.07*	-[a]	-[a]	-[a]	-[a]
Got promoted at work	1.51	-0.89	41%	0%	-.02	-.02	-.02	-.02	-[a]	-[a]	-[a]	-[a]
Began regular work after graduation	1.51	-0.38	51%	3%	.02	.03	.06	.07	.04	.01	.00	.00
Increased working hours	1.34	-1.06	21%	44%	-.03	-.04	-.02	-.02	.03	.03	.05	.05
Change in financial situation (much better or worse)	1.18	-0.89	84%	29%	-.01	-.03	.02	.01	.04	.05	.08*	.09*
Quit a job / Lay-off	1.18	-0.38	5%	19%	.11	.10	.06	.06	.03	.02	-.01	.00
Changed major/stopped university studies/apprenticeship	1.02	-0.89	17%	4%	.05	.05	.08*	.08	.06	.04	.06	.06
Failed an important exam	0.86	-1.06	8%	29%	-.05	-.04	.00	-.01	.10**	.10**	.07*	.06
Changed to another university/apprenticeship	0.86	-0.38	22%	3%	.07	.08*	.10**	.11**	.05	.04	.06	.06
Went abroad	0.38	-0.03	95%	2%	-.12	-.15*	-.02	-.04	.14	.15	.06	.07*
Moved out of home	0.05	0.48	54%	4%	-.04	-.06	.00	.00	.06	.03	.00	.00
Borrowed a large amount of money (more than €1,000)	0.05	-0.72	8%	15%	-.03	-.02	-.02	-.03	.06	.06	.06	.06
Own injury or illness	-0.27	-0.38	3%	54%	.00	.03	.00	.00	.03	.03	.06	.06
Quit smoking	-0.27	-0.72	17%	1%	-.02	-.03	.00	-.01				
Change in eating habits (much more or less food	-0.43	-0.89	34%	26%	.09**	.10**	.11**	.11**	-.05	-.05	-.04	-.04

intake)																
Convicted for a minor offence (fare dodging, speeding, etc.)		-0.59	-0.55		4%	24%		-.03	-.04		-.01	-.01		.02	.02		.03	.02
Started psychotherapy		-0.59	0.48		13%	2%		.04	.07		.06	.08		-.09	-.06		-.05	-.05
Broke off a relationship with a boyfriend/girlfriend		-0.75	1.16		18%	48%		.10*	.11**		.09**	.10**		.01	.00		.02	.02
Illness or injury of a family member		-0.75	1.16		2%	77%		.01	.01		.01	.01		-.01	-.01		.00	.00
Illness or injury of a friend		-0.75	1.16		1%	45%		-[a]	-[a]		-[a]	-[a]		.02	.02		.05	.06
Change in sleeping habits (much more or less sleep)		-0.75	-1.06		15%	39%		.13**	.14**		.12***	.11***		.03	.04		.02	.02
Sexual problems		-0.91	0.14		1%	25%		-[a]	-[a]		-[a]	-[a]		.05	.05		.08*	.08*
Death of a friend		-0.91	0.65		0%	16%		-[a]	-[a]		-[a]	-[a]		.02	.03		.03	.03
Had an abortion (self or partner)		-0.91	0.31		0%	2%		-[a]	-[a]		-[a]	-[a]		-.02	.02		-.02	-.01
Got pregnant (self or partner)		-0.91	2.02		20%	1%		-.06	-.07		-.05	-.04		-[a]	-[a]		-[a]	-[a]
Entered a new relationship (lasting at least 1 month)		-1.08	2.02		63%	7%		.02	.03		.01	.02		.11	.10		.02	.02
Death of a family member		-1.08	0.65		1%	62%		-[a]	-[a]		-[a]	-[a]		-.05	-.04		-.02	-.02
Parents broke up or divorced		-1.08	0.31		2%	4%		.04	.07		.02	.03		.01	.01		.02	.02
Got married		-1.24	2.02		27%	0%		-.07*	-.08*		-.03	-.04		-[a]	-[a]		-[a]	-[a]

Note. *N* without control variables = 2,571 (narcissistic admiration) and 2,572 (Machiavellianism); *N* with control variables = 4,600. Results of 240 separate regression analyses that were performed within 240 different true individual change models (Figure 1): 2 (positively vs. negatively evaluated) × 2 (event dummies vs. continuous event scores) × 2 (without vs. with control variables) models for each of the 30 life events. In the models with control variables, we controlled for initial level of self-esteem, gender, age, grade point average, figural and verbal reasoning, a dummy for whether the participant indicated having been born abroad, a dummy for whether the participant indicated that her/his parents had been born abroad, the education of the participants' parents, a dummy that indicated whether a participant was studying. DV = dependent variable; dum = event dummies; cont = continuous event scores; *b* = unstandardized regression coefficient; β = standardized regression coefficient; cvs = control variables.

[a] These events were experienced by less than 15 people and thus the results were not trustworthy.

* $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Table 4.14

Comparison of Results with and Without Control Variables: Socialization effects of 30 Life Events on Changes in ***Machiavellianism***

	Expert Rating		Base rate (dum = 1)		Event **positively** evaluated				Event **negatively** evaluated			
					dum *b*		cont β		dum *b*		cont β	
Event	Agency	Comm -union	positive	negative	w/o cvs	with cvs	w/o cvs	with cvs	w/o cvs	with cvs	w/o cvs	with cvs
Started a new job	1.67	-0.89	91%	7%	-.19**	-.20**	-.11**	-.12**	.07	.09	.06	.07
Won an academic award or prize	1.67	-1.40	45%	1%	-.01	.01	.00	.02	-[a]	-[a]	-[a]	-[a]
Got promoted at work	1.51	-0.89	41%	0%	.04	.05	.02	.04	-[a]	-[a]	-[a]	-[a]
Began regular work after graduation	1.51	-0.38	51%	3%	-.02	-.01	-.03	-.02	.11	.16	.05	.06
Increased working hours	1.34	-1.06	21%	44%	-.03	-.04	-.03	-.03	.06	.07	.08	.08
Change in financial situation (much better or worse)	1.18	-0.89	84%	29%	-.04	-.03	-.03	-.03	.05	.07	.06	.06
Quit a job / Lay-off	1.18	-0.38	5%	19%	-.13	-.10	-.06	-.06	.06	.05	.06	.05
Changed major/stopped university studies/apprenticeship	1.02	-0.89	17%	4%	-.03	-.04	-.02	-.02	.17	.13	.07	.06
Failed an important exam	0.86	-1.06	8%	29%	-.07	-.07	-.05	-.04	.00	-.01	.02	-.01
Changed to another university/apprenticeship	0.86	-0.38	22%	3%	-.01	.00	.00	.01	-.02	-.06	.00	-.01
Went abroad	0.38	-0.03	95%	2%	.04	.01	-.01	-.01	.11	.11	.06	.06
Moved out of home	0.05	0.48	54%	4%	.00	.00	.00	.00	-.06	-.03	-.02	-.01
Borrowed a large amount of money (more than €1,000)	0.05	-0.72	8%	15%	.04	.02	.02	.01	.00	-.02	.01	.00
Own injury or illness	-0.27	-0.38	3%	54%	-.14	-.15	-.04	-.05	.03	.04	.05	.06
Quit smoking	-0.27	-0.72	17%	1%	.07	.09	.07	.07	-[a]	-[a]	-[a]	-[a]
Change in eating habits	-0.43	-0.89	34%	26%	.04	.05	.02	.03	.01	.03	-.01	.00

(much more or less food intake)															
Convicted for a minor offence (fare dodging, speeding, etc.)		-0.59	-0.55		4%	24%		.20	.11		.05	.03		-.02	-.02		-.01	-.01
Started psychotherapy		-0.59	0.48		13%	2%		.03	.04		-.01	-.01		-.22**	-.17		-.07**	-.05*
Broke off a relationship with a boyfriend/girlfriend		-0.75	1.16		18%	48%		.00	.01		.01	.02		.08*	.08*		.06	.08
Illness or injury of a family member		-0.75	1.16		2%	77%		-.02	-.02		-.02	-.02		-.04	-.02		-.01	.01
Illness or injury of a friend		-0.75	1.16		1%	45%								-.06	-.05		-.04	-.03
Change in sleeping habits (much more or less sleep)		-0.75	-1.06		15%	39%		-.05	-.06		-.06	-.06		.00	.02		.03	.03
Sexual problems		-0.91	0.14		1%	25%		-[a]	-[a]		-[a]	-[a]		.06	.06		.05	.05
Death of a friend		-0.91	0.65		0%	16%		-[a]	-[a]		-[a]	-[a]		.07	.09		.03	.04
Had an abortion (self or partner)		-0.91	0.31		0%	2%		-[a]	-[a]		-[a]	-[a]		.06	.07		.03	.03
Got pregnant (self or partner)		-0.91	2.02		20%	1%		-.10*	-.08*		-.06	-.04		-[a]	-[a]		-[a]	-[a]
Entered a new relationship (lasting at least 1 month)		-1.08	2.02		63%	7%		.04	.04		.03	.04		.21*	.20*		.09*	.10*
Death of a family member		-1.08	0.65		1%	62%		-[a]	-[a]		-[a]	-[a]		-.05	-.05		-.02	-.01
Parents broke up or divorced		-1.08	0.31		2%	4%		-.10	-.07		-.01	.00		-.06	-.01		.01	.01
Got married		-1.24	2.02		27%	0%		-.04	-.04		-.07*	-.07		-[a]	-[a]		-[a]	-[a]

Note. *N* without control variables = 2,571 (narcissistic admiration) and 2,572 (Machiavellianism); *N* with control variables = 4,600. Results of 240 separate regression analyses that were performed within 240 different true individual change models (Figure 1): 2 (positively vs. negatively evaluated) × 2 (event dummies vs. continuous event scores) × 2 (without vs. with control variables) models for each of the 30 life events. In the models with control variables, we controlled for initial level of self-esteem, gender, age, grade point average, figural and verbal reasoning, a dummy for whether the participant indicated having been born abroad, a dummy for whether the participant indicated that her/his parents had been born abroad, the education of the participants' parents, a dummy that indicated whether a participant was studying. DV = dependent variable; dum = event dummies; cont = continuous event scores; *b* = unstandardized regression coefficient; β = standardized regression coefficient; cvs = control variables.

[a] These events were experienced by less than 15 people and thus the results were not trustworthy.

* $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

5

General Discussion

5. General Discussion

5.1 Summary of Results

With three studies, this dissertation investigated the assessment, dimensionality, and development of narcissism in early adulthood. Study 1 investigated the closeness to unidimensionality and measurement precision of responses to two established narcissism questionnaires, the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979) and the Narcissistic Admiration and Rivalry Questionnaire (NARQ; Back, 2013). The subscales of the NARQ showed higher closeness to unidimensionality and measurement precision than the subscales of the NPI. But this was the case only when the NPI was administered with a pairwise forced-choice response format, not when the NPI was—like the NARQ—administered with a Likert-scale response format.

Study 2 focused on the often-reported but recently questioned association between narcissism and overclaiming bias (i.e., the tendency to illegitimately claim knowledge). To clarify the narcissism-overclaiming link, we investigated how different dimensions and subdomain-specific forms of narcissism are related to overclaiming bias. The findings show that the various dimensions of narcissism and subdomain-specific forms of narcissism differ in their relationship to overclaiming bias. Most important for the dissertation, assertive narcissism (~ narcissistic admiration)—but not antagonistic narcissism (~ narcissistic rivalry) or vulnerable narcissism—was positively related to overclaiming bias.

Study 3 investigated how narcissistic admiration and Machiavellianism (Mach) develop during early adulthood and how their development is related to environmental circumstances (i.e., university majors and life events). We analyzed the data of two cohorts from the longitudinal TOSCA study (N_1 = 4,962 and N_2 = 2,572). Mean levels of narcissistic admiration barely changed during early adulthood, whereas mean levels of Machiavellianism declined. Furthermore, although people high in Machiavellianism more frequently choose to major in economics, studying economics at university was not related to the development of Mach or narcissistic admiration. The occurrence of some life events was related to the development of the two traits. For example, we found that a positively evaluated change in eating or sleeping habits was accompanied by an increase in narcissistic admiration in early adulthood.

5.2 Theoretical Implications

5.2.1 The Assessment and Dimensionality of Narcissism

As outlined in the Introduction, the assessment and dimensionality of the narcissism construct has been hotly debated, and a solid consensus has yet to be reached. Recent studies have suggested that three dimensions underlie the construct: narcissistic admiration, narcissistic rivalry, and vulnerable narcissism (e.g., Back et al., 2013; Miller et al., 2016). Studies 1 and 2 make several contributions to this debate.

Study 1 mainly supports Back et al.'s (2013) assertion that the NARQ measures two and only two distinct dimensions of grandiose narcissism: narcissistic admiration and narcissistic rivalry. The two NARQ subscales showed high levels of closeness to unidimensionality and very high levels of measurement precision (Table 2.2). Furthermore, the two dimensions were *not* too highly correlated (all *r*s < .50; Chapter 2.6: Table 2.21), which supports the notion that narcissistic admiration and rivalry are distinct dimensions of grandiose narcissism.

In contrast to our expectation that the NPI subscales would have poorer psychometric properties than the NARQ subscales,[14] some NPI subscales (i.e., Leadership/Authority and Grandiose Exhibitionism of the NPI Likert-scale version; Ackerman et al., 2011) also showed high to very high levels of closeness to unidimensionality and measurement precision in Study 1. These results suggest that the NPI, or at least its Likert scale version, adequately measures more than one dimension of narcissism, notwithstanding the fact that the NPI was created to measure a unidimensional construct.

Important for the dimensionality debate, the lack of overlap between the latent traits of the various NPI and NARQ subscales (all but one $r \leq .60$; Chapter 2.6: Table 2.21) suggest that the NARQ and NPI items assess more than two dimensions. This finding is in contrast to at least one of two claims made by narcissism researchers: (a) grandiose narcissism consists of two

[14] We expected the NPI subscales to show poorer psychometric properties than the NARQ subscales because the NPI was not developed with subscales in mind. It was developed as a unidimensional narcissism questionnaire (Raskin & Terry, 1988). Furthermore, previous studies on the NPI could not extract a robust factor structure (i.e., the factor structure was inconsistent across studies). Yet, the dimensionality issues (e.g., inconsistent factor structure) reported in the literature seem to be partly due to the forced-choice response format (for details, see Chapter 2.4; see also Ackerman, Donnellan, Roberts, & Fraley, 2015).

dimensions (Back et al., 2013), and (b) the NARQ and NPI both measure grandiose narcissism and grandiose narcissism only (e.g., Back et al., 2013; Miller et al., 2011)—some authors have suggested that the NPI also measures non-narcissistic qualities (e.g., Brown et al., 2009; Emmons, 1987). In other words, our results suggest either that grandiose narcissism consists of more than two dimensions or that some NPI or NARQ subscales/items measure something other than grandiose narcissism.

In favor of the notion that some NPI subscales measure something other than grandiose narcissism, some authors have pointed out that characteristics such as leadership are not part of the DSM's description of Narcissistic Personality Disorder (e.g., Brown et al., 2009; Emmons, 1987; see also Pincus & Lukowitsky, 2010). Thus, one might question whether the NPI subscale Leadership/Authority, which showed very good psychometric properties when administered with a Likert-scale response format (Table 2.2), should be considered a dimension of grandiose narcissism.

That said, Miller and Campbell (2011) argued that leadership should be part of narcissism because (a) the DSM is not the ultimate arbiter of a construct, (b) leadership was part of Freud's and Reich's narcissism constructs, and (c) the NPI leadership subscale is substantially correlated with the other NPI subscales (see also Emmons, 1987). Similarly, Miller and Campbell (2011) do not view it as problematic that some aspects of the NPI are negatively associated with characteristics of internalization (e.g., distress, neuroticism, loneliness, and depression; e.g., Sedikides, Rudich, Gregg, Kumashiro, & Rusbult, 2004). They argued that the problem that people high in grandiose narcissism have is not internalization but externalization: It is not they themselves who suffer but the people with whom they interact.

I think the debate about whether the NPI does or does not capture all narcissistic characteristics reflects the differences in the conceptualizations of narcissism held by social/personality psychologists versus clinical psychologists (Ackerman et al., 2016; Miller & Campbell, 2008). According to Miller and Campbell (2008), social/personality psychologists refer to Freud's definition of narcissism as a personality characterized by independence ("narcissistic libidinal type"; Freud, 1931/1955; Chapter 1.1.1), whereas clinicians tend to have Kernberg's description of narcissism in mind instead (i.e., narcissism as a personality disorder similar to a borderline personality; Kernberg, 1970, 1974; Chapter 1.1.3; Chapter 1.2: Footnote 1).

These differences in the conceptualizations of narcissism are in turn probably the consequence of differences in the participants and research foci of the two fields: Social/personality psychologists usually investigate narcissism in healthy undergraduate students and are mainly interested in the social consequences of narcissism (popularity, aggressive behavior, etc.). Clinical psychologists frequently study narcissism in patients who sought the help of a clinician because they suffered from internalization problems.

Taken together, whereas many social/personality psychologists believe that all characteristics measured by the NPI are an integral part of grandiose narcissism, clinical psychologists tend to focus on the narcissism characteristics described in the DSM and thus argue that some characteristics assessed by the NPI are not narcissistic (e.g., leadership). If we accept that both the NPI and NARQ measure grandiose narcissism, the results of Study 1 indicate that there are more dimensions of grandiose narcissism than the two proposed by Back et al. (2013) because the NPI subscales Leadership/Authority and Grandiose Exhibitionism showed decent psychometric properties and considerable nonoverlap with the two NARQ subscales (Tables 2.2 and 2.21).

Study 2 has similar implications for the debate on the assessment and dimensionality of narcissism. In line with the proposed three-dimensional structure (narcissistic admiration, narcissistic rivalry, and vulnerable narcissism; Chapter 1.2.3), we extracted three (second-order) factors from the subscales of various narcissism questionnaires (Chapter 3.2.3: Figure 3.1). Also in line with the three-dimensional structure, the three second-order factors showed diverging associations with overclaiming bias (i.e., a form of self-enhancement). One of the three factors showed a positive correlation with overclaiming bias, whereas the other two factors were uncorrelated.

In contrast to the three-dimensional structure, the fit of the second-order model we used to extract the three factors was moderate. The fit was poor when we used individual items as indicators (i.e., when we did not use internal consistency parceling). The moderate and poor fit, respectively, might indicate that the various subscales do not measure the same second-order factor or that the proposed structure is too simple. Furthermore, the fact that we needed to use a second-order factor model in the first place can be taken as evidence against the three-dimensional structure. If only three dimensions explained most of the variance in the responses to the items from the various narcissism scales, we should have been able to fit a three-

dimensional factor model without the need for second-order factors (i.e., all items would have loaded directly on one of the three factors). Thus, Study 2 also suggests that there are more than three dimensions of narcissism and that the proposed three-dimensional structure (narcissistic admiration, narcissistic rivalry, vulnerable narcissism) is too simple.

In summary, both studies confirmed the two dimensions proposed by Back et al. (2013): narcissistic admiration (or assertive narcissism) and narcissistic rivalry (or antagonistic narcissism; see also Miller et al., 2016). Furthermore, Study 2 indicated that it is important to distinguish these two dimensions as well as vulnerable narcissism. That said, the studies also suggested that there are more than these three dimensions of narcissism in existence or at least that more than these three dimensions are captured by the established narcissism questionnaires that we used.

5.2.2 The Development of Narcissism

5.2.2.1 Mean-Level Changes

In Study 3, the mean levels of narcissistic admiration did not change much during early adulthood. Although these results seem to contradict the cross-sectional studies that found negative correlations between the NPI total score and age (e.g., Foster, Campbell, & Twenge, 2003; Hill & Roberts, 2012), the results are in line with two longitudinal studies on the development of grandiose narcissism in early adulthood (Carlson & Gjerde, 2009; Orth & Luciano, 2015). A difference between the cross-sectional and the longitudinal studies (including Study 3) is that the longitudinal studies focused on the first phase of early adulthood (ages 20 to 30) whereas the cross-sectional studies covered the whole range of adulthood and even included elderly people. Thus, the cross-sectional studies might have found negative correlations between grandiose narcissism and age because grandiose narcissism tends to decrease after the period covered by the longitudinal studies (i.e., after the first phase of early adulthood).

An alternative interpretation is that only narcissistic admiration remains unchanged between the ages of 20 and 30, and other aspects of grandiose narcissism that are measured by the NPI decrease during this phase. This interpretation contradicts the findings of the two longitudinal studies (Carlson & Gjerde, 2009; Orth & Luciano, 2015). But these two studies have several limitations (e.g., short time frame, use of the short version of the NPI or observer ratings

to estimate the NPI scores, small- to medium-sized samples). Thus, we cannot rule out the possibility that, in contrast to narcissistic admiration, the dimensions of grandiose narcissism that are measured by the NPI do decrease from age 20 to 30.

The finding that grandiose narcissism, or at least narcissistic admiration, does not decrease from age 20 to 30 seems to challenge some theories and perceptions of adolescence and early adulthood. First, narcissism is often believed to peak in adolescence and decrease thereafter (e.g., Bleiberg, 1994; Hill & Roberts, 2011; Thomaes, Bushman, De Castro, & Stegge, 2009). Second, adolescents are perceived to score higher on characteristics related to narcissism (e.g., selfishness, stubbornness, risk-taking) than people from other age groups (Buchanan & Holmbeck, 1998). In the time frame we investigated (from age 20 to 30), we did not find such a decrease in narcissistic admiration. Perhaps other dimensions of grandiose narcissism decrease during that time period, and perhaps narcissistic admiration decreases between adolescence and age 20.

The finding that narcissistic admiration does not decline during the first phase of early adulthood suggests that narcissistic admiration is adaptive or at least not maladaptive during the turbulent and challenging transition to adulthood. In line with this interpretation, Hill and Roberts (2011, 2012) argued that assertive aspects of narcissism (inflated sense of self, self-focus, optimism) can help people handle the challenging transition to adulthood and to establish themselves in the workplace (see also Chapter 1.4.2). Hill and Roberts (2012) also found that the NPI subscales that were most strongly related to narcissistic admiration (Chapter 2.6: Table 2.21) were positively related to life satisfaction in young adults under the age of 25 but not in young adults older than 25. That said, even though the mean levels of narcissistic admiration did not decrease in Study 3, they also *did not increase*. Furthermore, narcissistic admiration predicted the subsequent occurrence of a number of negative life events (Table 4.2). Taken together, narcissistic admiration does not appear to be clearly maladaptive or clearly adaptive during the first phase of early adulthood (from age 20 to 30).

Finally, the relatively stable mean levels found for narcissistic admiration stand in contrast to the large and robust mean-level changes reported for emotional stability, conscientiousness, social dominance (i.e., a facet of extraversion), and agreeableness between ages 20 and 30 (e.g., Roberts et al., 2006). Hence, Study 3 also underscores the distinction between narcissistic admiration and these Big Five personality traits.

5.2.2.2 Environmental Influences on the Development of Narcissism

Research on the Big Five personality traits has repeatedly indicated that the environment is related to personality development during early adulthood (Chapter 1.4.1). Study 3 investigated whether environmental circumstances are also related to the development of narcissism during early adulthood.

The results of our analysis of the TOSCA data in Study 3 are somewhat ambiguous. On the one hand, we did not find the expected socialization effect of studying economics at university on changes in narcissistic admiration. And the agency and communion event scores were not related to changes in narcissistic admiration during early adulthood. On the other hand, several event scores for individual life events were significantly ($p < .01$) related to changes in narcissism. We cannot rule out the possibility that one or two of these effects were false positives. But the fact that four or five (depending on the scoring method) were significantly related to individual differences in changes in narcissism suggests that some life events indeed influence the development of narcissistic admiration in early adulthood.

What kind of life events shape the development of narcissism in early adulthood? The five life events related to the development of narcissistic admiration were: a positively evaluated change in eating or sleeping habits, a positively evaluated end of a romantic relationship, a positively evaluated change to another university or apprenticeship, and a negatively evaluated failure of an important exam. All these events were positively related to changes in narcissistic admiration.

Four of the five events (all except for the failure of an important exam) were positive long-lasting changes in the young adults' lives. When a person regularly eats unhealthy food or does not sleep enough, then a change in eating or sleeping habits might lead to more health, well-being, and a different sense of self in the long run. When a person is in a dysfunctional or unsatisfying relationship, the end of that relationship might provide relief and leave the person free to meet new long-term relationship partners or to have other meaningful experiences. When a person is unhappy at one university, the change to another university or apprenticeship might increase the person-environment fit permanently. These four events can be interpreted as important corrections to the life path, corrections that can shape how people view themselves and might bestow upon them a sense of narcissistic empowerment and assertiveness.

It is interesting that these four events seem to be *actively* chosen events rather than *passively* experienced events—even though we do not know, for example, who broke up with whom. Taking control of and determining one's own life might lead to increases in narcissistic admiration. Perhaps one can even say, with reference to Kohut (1966, 1971), that these events are an expression of creativity and a playful way of dealing with life and one's surroundings (see also Chapter 1.1.2). These creative acts, if positively experienced, might foster narcissistic drives and self-views.

5.3 Implications for Educational Research

An important take-away message for educational research is that various dimensions of narcissism need to be distinguished. Distinguishing various dimensions seems warranted because ignoring the multidimensionality of a construct or questionnaire (e.g., using the NPI total score) can hamper the interpretation of the results in several ways.

If the multidimensionality of a questionnaire is ignored (i.e., when the narcissism variable is either the total score of a multidimensional narcissism questionnaire or the latent variable with all questionnaire items as indicators), it remains unclear whether an association between the narcissism variable and another variable (e.g., a specific behavioral outcome) is driven by all or by only some dimensions. Some dimensions might not show the association found for the narcissism variable. For example, previous research that did not differentiate various dimensions of narcissism found that the NPI total score was related to overclaiming bias. Study 2 indicated that only assertive narcissism but not antagonistic or vulnerable narcissism was linked to overclaiming bias. Similarly, Ackerman et al. (2011) found a positive relationship between the NPI total score and self-esteem even though the Entitlement/Exploitativeness subscale of the NPI was not associated with self-esteem (for similar examples, see Brown et al., 2009; Exline, Baumeister, Bushman, Campbell, & Finkel, 2004; Zeigler-Hill & Besser, 2013).

Perhaps even worse, educational researchers who ignore the multidimensionality of a narcissism questionnaire might *not* detect an existing association. This can happen if some of the underlying narcissism dimensions are positively associated with the variable of interest, whereas other dimensions are negatively associated with that variable. Briggs and Cheek (1986), for example, broke up the self-monitoring scale into three subscales and found that two subscales were negatively related to social anxiety, whereas one subscale was positively related to social anxiety. As the associations canceled each other out, the total scale score was neither positively nor negatively related to social anxiety.

In structural equation modeling, ignoring the multidimensionality of narcissism questionnaires in the measurement models can bias parameter estimates (i.e., loadings that are too high, error estimates that are too low). Thus, observed associations among measured variables might be inaccurate (i.e., structural coefficient bias; Reise, Bonifay, et al., 2013; Reise, Scheines, Widaman, & Haviland, 2013). This issue seems particularly relevant for educational

researchers given that structural equation modeling is frequently used in large-scale educational studies.

To decide whether a narcissism scale is "unidimensional enough" to prohibit severe biases in model parameters, educational researchers might want to calculate and inspect the *explained common variance* and the *percentage of (un)contaminated correlations*, as was done by Reise, Scheines, et al. (2013) or in Study 1. Alternative ways to check whether the data are unidimensional enough include inspecting model fit statistics (e.g., RMSEA, SRMR, and CFI) or calculating and inspecting the Dimensionality Evaluation to Enumerate Contributing Traits index (DETECT; e.g., Bonifay, Reise, Scheines, & Meijer, 2015; Kim, 1994; Zhang & Stout, 1999). That said, these two alternatives have been found to be less diagnostic of bias in parameter estimates than the explained common variance in combination with the percentage of (un)contaminated correlations (e.g., Bonifay et al., 2015; Reise, Scheines, et al., 2013).

Even if the narcissism questionnaire that is used is "unidimensional enough," it is important to know and to take into account which dimension of narcissism is measured by the questionnaire. If a researcher does not know which dimension is being assessed, the results cannot be interpreted appropriately and cannot be compared with studies that used other narcissism questionnaires. For example, if we had *not* validated the TOSCA narcissism items, we would *not* have known that the results of Study 3 are applicable only to narcissistic admiration. As a consequence, we would have interpreted the results of Study 3 differently. We might have assumed that the results were valid for narcissism in general even though some other dimensions of narcissism (e.g., narcissistic rivalry) might develop differently during early adulthood (see Chapter 1.4.2).

Aside from dimensionality, an implication of the dissertation is that overclaiming bias might be less of an issue for the academic performance of people high in assertive narcissism (~ narcissistic admiration) than one might expect on the basis of previous research. Previous studies have often reported a medium-sized effect for the correlation between unspecific narcissism (e.g., NPI total score) and overclaiming bias (e.g., Paulhus, Harms, Bruce, & Lysy., 2003). I thought the correlation between unspecific narcissism and overclaiming bias was driven by assertive narcissism but not by the other dimensions (Chapter 1.3.1). Thus, I expected that the link between assertive narcissism (~ narcissistic admiration) and overclaiming bias might be even larger than a medium effect size. Furthermore, I expected this effect to be part of a negative

pathway from narcissistic admiration via overclaiming bias to academic performance (Chapter 1.3.1: Figure 1.1) because Paulhus and Dubois (2014) reported that overclaiming bias is negatively related to academic performance. However, in Study 2, the correlation between assertive narcissism (~ narcissistic admiration) and overclaiming bias was relatively small (r = .11). Thus, the proposed negative pathway from narcissistic admiration via overclaiming bias to academic performance appears to be negligible.

5.4 Implications for Educational Practice

Studying economics was not significantly related to the development of narcissistic admiration in Study 3, but two educational life events were: the negatively evaluated *failure of an important exam* and the positively evaluated *change to another university or apprenticeship*. Given that the two life-event effects were exploratory, it is too early to draw any strong conclusions about how educational events influence the development of narcissistic admiration.

If the socialization effect of *failing an important exam* on narcissistic admiration were to be confirmed in future research, this might be problematic because the higher levels of narcissistic admiration (e.g., grandiose self-views and assertiveness) seem to be defensive, compensatory, and inflated and thus potentially psychologically unhealthy (e.g., Kernberg, 1970, 1974; Pulver, 1970). Teachers and educators might want to prevent such an unhealthy reaction by giving students emotional support when teachers communicate the results of important exams. Furthermore, teachers might want to track students' reactions to exam failures and consider asking for psychological support if the teachers detect that a student is reacting in a potentially unhealthy way.

If the effect of the positively evaluated *change to another university or apprenticeship* were to be confirmed in future research, I do not think this finding would have implications for educational practice. I think the increase in narcissistic admiration after a positive change is not problematic. Increases in assertiveness, grandiose self-views, and focus on the self might be normal after a positive change in one's learning environment.

Previous research has suggested that narcissistic rivalry and vulnerable narcissism are maladaptive in most educational situations (Chapter 1.3). Thus, educational interventions might want to target these two dimensions of narcissism. Unfortunately, these two dimensions of narcissism were not assessed in the TOSCA study. Therefore, I cannot draw inferences from Study 3 about which environments might lead to decreases in narcissistic rivalry or vulnerable narcissism.

Generally, more research is needed before we can arrive at well-founded implications and recommendations for educational practice.

5.5 Strengths and Limitations

The transparency, reproducibility,[15] and replicability of psychological studies has often been questioned throughout the history of psychological research, especially recently (e.g., De Groot, 1956/2014; Open Science Collaboration, 2015; Simmons, Nelson, & Simonsohn, 2011). Most prominently, in a 2015 Science article, a group of 270 researchers attempted to replicate 100 effects reported in three flagship journals in the field of psychology (Open Science Collaboration, 2015). The authors of the Science paper deemed that only 39% of the attempted 100 replications were successful. This and other recent studies (e.g., Ebersole et al., 2016) suggest that there is room to improve the transparency, reproducibility, and replicability of psychological studies.

A discussion of all the potential reasons for lack of transparency, reproducibility, and replicability and the steps needed to increase transparency, reproducibility, and replicability would go beyond the scope of this dissertation (for reviews, see e.g., Asendorpf et al. 2013; Munafò et al., 2017). Here, I just want to explain the steps taken in the three studies of this dissertation to increase transparency, reproducibility, and replicability.

1. In Studies 2 and 3, we pre-registered the hypotheses. Pre-registrations make the distinction between exploratory and confirmatory findings more transparent, and thus pre-registrations make *p*-values more interpretable (e.g., De Groot, 1956/2014; Moore, 2016; Wicherts et al., 2016). Pre-registrations should furthermore be able to increase replicability by preventing hindsight bias, hypothesizing after results are known (HARKING) by authors, and critiquing after the results are known (CARKING) by reviewers (e.g., Kerr, 1998; Munafò et al., 2017). Because pre-registering a study usually involves the commitment to make the results public, pre-registrations should also reduce selective reporting (i.e., the problem that many nonsignificant or unspectacular findings are not published, also called the "file drawer problem"; e.g., Rosenthal, 1979; Simonsohn, Nelson, & Simmons, 2013).

[15] Here, reproducibility refers to the ability to reproduce the results of a study with the original data.

2. For all three studies, we made use of the Open Science Framework to share the R Code, Output Files, other supplemental materials, and—when possible—the data.[16] Sharing all these materials and documents increases the transparency and reproducibility of studies (e.g., Sijtsma, 2016).
3. Across the three studies, we used large samples to test our research questions and hypotheses. The median sample size was 1,682 (including the three validation studies for the TOSCA items) and 2,260.5 (excluding the validation studies for the TOSCA items). Holding all else constant, the larger the sample size, the smaller the Type I (false positives) and Type II (false negatives) error rates. Thus, the larger the samples, the higher the replicability.
4. Two of the three studies (i.e., Studies 1 and 3) were co-authored by methodologists who had no personal investment in the research topic (Norman Rose and Wilco H.M. Emons). Munafò et al. (2017) have argued that including independent methodologists not only increases the quality of the statistical methods applied but also reduces confirmation bias (i.e., the tendency to focus on evidence that is in line with researchers' expectations or favored explanation; for a similar argument see, Sijtsma, 2016). Thus, including independent methodologists should make the findings more replicable.

Some of the steps we took (i.e., pre-registrations and sharing materials in the Open Science Framework) have hardly ever been implemented until recently. Thus, time-proven guidelines to implement these measures have yet to be established (for new guidelines on pre-registrations, see e.g., Wicherts et al., 2016). This lack of guidelines and experience led to some challenges during the implementation and limitations of the implementation. The use of pre-registrations is a good case in point. The Study 2 pre-registration and especially the Study 3 pre-registration should have included more details about the plan for data analysis and the exclusion criteria (Wicherts et al., 2016). For example, in Study 2, we did not specify in advance that we would recode responses as missing when participants answered with the lowest answer category on 45 items or more in a row. To be truly confirmatory research, all these criteria and decisions

[16] Only the data from Studies 1 and 2 were shared because we did not have the consent of participants to share the data from Study 3.

would need to be pre-registered. Overall, the steps we took have nevertheless fulfilled their purpose and increased the transparency, reproducibility, and replicability of the studies.

A further strong suit of the studies is their use of advanced statistical procedures to model latent traits. In his seminal article on the limited usefulness of Cronbach's alpha, Sijtsma (2009) pointed out that there is a gap between psychology and psychometrics:

> […] after the 1950s, psychometrics has developed to become more mathematically and statistically oriented while psychologists primarily have remained psychologists. One can argue whether psychologists should become better statisticians or whether psychometricians should become better psychologists (Borsboom, 2006), but it is a fact that the two worlds have drifted apart more than anyone should wish. (p. 115)

Throughout this dissertation, it was my aim to narrow this gap between psychology and psychometrics by applying advanced psychometric methods: latent trait modeling via structural equation modeling, item response theory, minimum rank factor analysis, and so forth. Although mastering these methods was time-intensive and challenging, I believe the dissertation and the validity of the results have benefited a great deal from the effort.

One limitation of the dissertation is its predominant reliance on self-report instruments (but see also the use of the overclaiming questionnaire in Study 2). That said, self-report questionnaires are the most widely used and validated method for assessing personality traits such as narcissism or the Big Five, and the dimensionality and development of these traits is usually investigated with self-report data.

Finally, the samples for Study 1 were from Western countries (USA, Germany) and the samples for Studies 2 and 3 were all from Germany. Thus, we do not know the extent to which the results of the three studies are valid for other, especially non-Western, countries and cultures.

5.6 Directions for Future Research

5.6.1 The Dimensionality of Narcissism

The field of narcissism research seems to be cursed by uncertainty about the dimensionality of narcissism. The current dissertation is no exception. Although the proposed three-dimensional structure (narcissistic admiration, narcissistic rivalry, vulnerable narcissism; Chapter 1.2) was confirmed in part by the dissertation, several findings of the dissertation have suggested that narcissism consists of more than three dimensions.

One way forward is to abandon simple two- or three-dimensional models of narcissism and accept that narcissism consists of more than two or three dimensions. Narcissism researchers would then conduct research with all narcissism subscales that are able to show a good approximation to unidimensionality and that do not overlap with other subscales (i.e., latent correlations below .75 with all other subscales). However, this solution comes with some practical challenges. There are many narcissism questionnaires, and most of them contain several (nonoverlapping) subscales (see e.g., Chapter 2.6: Table 2.21). As examples, the most established narcissism questionnaires are: the NPI (at least 2 subscales; Raskin & Hall, 1979), NARQ (2 subscales; Back et al., 2013), Pathological Narcissism Inventory (7 subscales; Pincus et al., 2009), Psychological Entitlement Scale (no subscales; Campbell, Bonacci, Shelton, Exline, & Bushman, 2004). Due to space and time limitations, many researchers might use only some of these subscales. And because there is no agreement about which of the narcissism subscales narcissism researchers should focus on, the consequence would probably be a lack of comparability across narcissism studies—and such a lack of comparability already exists in the narcissism literature. Furthermore, assessing and reporting many dimensions might hamper the clarity and comprehensibility of the results, incurring the danger that readers might be confused. It is easier to comprehend, communicate, and discuss results involving a small number of dimensions (e.g., narcissistic admiration and rivalry) than those that involve six or more dimensions.

Another way forward that might be able to overcome these practical challenges would be to agree on two, three, or four second-order factors (i.e., broad narcissism traits). These second-order factors would each subsume, similar to the Big Five, a number of highly related

dimensions or facets. If we follow this argument, narcissism researchers could, for example, agree on the three second-order factors proposed in Study 2 (i.e., assertive, antagonistic, and vulnerable narcissism) and subsume the various subscales of established narcissism questionnaires under these three second-order factors (Chapter 3.2.3: Figure 3.1; for a different second-order structure, see Krizan & Herlache, 2017).

That said, the number and nature of the second-order factors would need to be further investigated and agreed on. Narcissism researchers could decide on the number and nature of the second-order factors on the basis of (a) theories about narcissism (e.g., Back et al., 2013) as we did in Study 2, (b) results of an exploratory factor analysis on a variety of subscales (e.g., Miller et al., 2016), or (c) expert ratings (i.e., clinical and social/personality psychologists) of features that are central to the narcissism concept (Ackerman et al., 2016). These three ways to decide on the number and nature of (broad) narcissistic traits were combined by Krizan and Herlache (2017). They proposed the Spectrum Model of Narcissism on the basis of (a) psychoanalytical conceptualizations of narcissism, (b) a factor analysis of the total scores from 26 narcissism subscales—which is comparable to extracting second-order factors from the item scores—, and (c) expert ratings of narcissistic features as reported by Ackerman et al. (2016). The Spectrum Model of Narcissism is a three-dimensional model of narcissism with a dimension called Grandiosity—which is very similar to narcissistic admiration or assertive narcissism—and a dimension called Vulnerability—which is very similar to vulnerable narcissism. In contrast to the model proposed in Study 2 and the model proposed by Miller et al. (2016), the third dimension of the Spectrum Model is entitlement rather than narcissistic rivalry or antagonistic narcissism.[17] Similar to the model in Study 2, the three-dimensional model proposed by Krizan and Herlache (2017) did not fit the data very well. Therefore, given the poor fit and the divergence between some of the proposed second-order factors, I can see there being four second-order factors: assertive narcissism, antagonistic narcissism, vulnerable narcissism, and

[17] Entitlement seems to be distinct from antagonistic narcissism. Entitlement is characterized by Ackerman et al. 2016) as the "belief that one has a right to some positive valued resource or outcome; however, such beliefs are not typically based on realistic appraisals, exceed what is due, and may never be satisfied". Antagonistic narcissism (narcissistic rivalry) rather emphasizes the tendency to devaluate others, to be aggressive, and the strive to be superior. That said, future studies research might want to investigate the equivalence of the three-dimensional model put forward by Krizan & Herlach (2017) and the three dimensional model put forward in the Study 2 and the one proposed by Miller et al. (2016): It needs to be tested how strongly antagonistic narcissism and entitlement overlap.

entitlement. Future research needs to test whether extracting four instead of three second-order factors fits the data better.

After an agreement on the number and nature of the second-order factors is achieved, items would need to be developed to assess the second-order factors directly. When researchers assess a Big Five trait, say extraversion, they do not assess every facet of extraversion with several items and extract a second-order factor from the item scores. Similarly, when assessing, for example, assertive narcissism, it would not be economical to assess all subscales or facets of assertive narcissism with several items (e.g., NARQ Narcissistic Admiration with 9 items, NPI Leadership/Authority with 11 items). Thus, narcissism researchers need to develop questionnaires that can assess the second-order factors directly. This could be done by identifying existing narcissism items that are strongly associated with the second-order factors; or it could by done by running a factor analysis on the narcissism items from all established narcissism questionnaires, extracting three or four factors, and then identifying which items show the strongest loadings on each factor.

Finally, there is a need for research to investigate the extent to which the various dimensions of narcissism overlap with the Big Five *facets*. Previous research has investigated the extent to which unspecific narcissism overlaps with the Big Five facets (Glover et al., 2012; O'Boyle, Forsyth, Banks, Story, & White, 2014) and the extent to which various dimensions of narcissism overlap with the Big Five *traits* (e.g., Back et al., 2013; Miller et al., 2017). However, not much research has investigated how the various dimensions of narcissism overlap with the various Big Five facets. It is important to know whether any dimension of narcissism overlaps considerably with one Big Five facet. This would make narcissism and Big Five research more comparable because dimensions of narcissism that overlap with Big Five facets could be located in the Big Five taxonomy. It would prevent different research teams from working on the same phenomenon under different labels.

5.6.2 The Development of Narcissism

The exploratory findings of Study 3 need to be confirmed before drawing any strong conclusions. In particular, the socialization effects of the five life events need to be confirmed. These life-event effects were tested in only one sample, and a considerable proportion of the

participants had missing values on the life-event variables. Thus, they need to be confirmed with fresh data.

If these effects are found to replicate, it would be instrumental to investigate why these life events are related to changes in narcissistic admiration. To explore the mechanisms that underlie these effects, researchers could conduct experiments or longitudinal studies that contain more questions about the influential life events. An experimental investigation might not be feasible for some of the life events for ethical and technical reasons (e.g., failing an important exam or experiencing the end of a romantic relationship). However, some of the events could be experimentally manipulated. For example, young adults could be randomly assigned to one of two conditions: (a) a condition in which they are encouraged to positively change their eating habits or (b) a condition in which no encouragement for a change in eating habits is provided. Designs such as this would allow causal interpretations of the results and could clarify the processes involved. Researchers could also investigate what drives the relationship between a life event and changes in narcissistic admiration by longitudinal studies with more questions about the events. For example, questions about the new university/apprenticeship could reveal why a change to another university/apprenticeship is associated with increases in narcissistic admiration: Does a better fit of people's abilities to the educational demands of their new university/apprentiship lead to an increase in narcissistic admiration? Or, is the relationship driven by a better fit to the social environment? In my opinion, such experiments and longitudinal studies have the potential to shed light on the underlying processes.

Future research might also investigate how contexts and events not considered in Study 3 influence the development of narcissism. The study by Jackson et al. (2012) suggested that military training influences the development of agreeableness in early adulthood. Lüdtke et al. (2011) reported that whether a person studies at university after high school or not influences the development of the Big Five during early adulthood. Future studies might want to test whether military training, studying at university, or other environments influence the development of narcissistic admiration.

Moreover, longitudinal studies on dimensions of narcissism other than narcissistic admiration (assertive narcissism) are needed. The few longitudinal studies on the subject have either focused on narcissistic admiration (Study 3) or did not differentiate various dimensions of narcissism (Carlson & Gjerde, 2009; Orth & Luciano, 2015). Due to this lack of longitudinal

research on other dimensions of narcissism, many questions are still open. For example, how do mean levels of narcissistic rivalry and vulnerable narcissism develop during early adulthood? Do they decrease because these other dimensions are maladaptive in early adulthood? A decrease in the less adaptive aspects of narcissism during early adulthood is expected on the basis of the logic of the maturity principle (e.g., Roberts, Wood, & Caspi, 2008) and neo-socioanalytic theory (Roberts & Wood, 2006; see also, Bleidorn et al., 2013; Hogan & Roberts, 2004): Age-related transitions and social and occupational roles should lead to an increasing number of commitments and expectations. These commitments and expectations should in turn lead not only to increases in conscientiousness, emotional stability, and agreeableness but also to decreases in (maladaptive) narcissistic tendencies such as narcissistic rivalry and vulnerable narcissism (e.g., Hill & Roberts, 2011; Roberts, Edmonds, & Grijalva, 2010). That said, we need empirical evidence to clarify the answers to these questions, especially because these other dimensions of narcissism most likely have more negative consequences than narcissistic admiration (see Chapter 1.3).

Finally, future studies are needed to investigate the factors that influence the development of narcissism before and after the period from age 20 to 30. Recently, there have been some studies on the origins and development of narcissism in children (e.g., Brummelman et al., 2015). However, these studies did not cover broad samples and time lags. Furthermore, they did not differentiate various dimensions of narcissism. Related to the lack of extensive longitudinal studies in childhood is the need for a well-validated narcissism questionnaire for children and adolescents that assesses more than one dimension of narcissism, preferably dimensions that are also found in adulthood.

Taken together, the existing studies (including Study 3) are only the first steps in investigating the development of narcissism and how the environment influences its development. A diverse variety of additional longitudinal (and experimental) studies would be desirable.

5.6.3 Narcissism and Educational Research

As already pointed out in the Introduction (Chapter 1.3), more research on the consequences of the various dimensions of narcissism is needed. Previous research suggests that the three dimensions of narcissism have a number of consequences in educational contexts: from

self-enhancement, to academic motivation and academic performance, to social behavior in the classroom and group settings. These consequences have mainly been investigated by social and personality researchers who have used laboratory settings or online studies with the exception of many studies on narcissism and bullying (see Chapter 1.3.4). Thus, educational researchers might want to test the consequences of the various dimensions of narcissism in classroom settings and their influence on key educational outcomes.

5.7 Conclusion

The current dissertation makes several contributions to the understanding of how narcissism develops in early adulthood. First, Studies 1 and 2 buttressed the notion that narcissism is not a unidimensional construct. Thus, longitudinal research is needed to distinguish various dimensions or kinds of narcissism. Second, Studies 1 and 2 indicated that more than three dimensions underlie the construct of narcissism. Until an agreement on the exact dimensionality of narcissism is achieved, developmental research might want to focus on the subscales of the most established questionnaires for measuring narcissism (i.e., the NPI, NARQ, Pathological Narcissism Inventory, and Psychological Entitlement Scale). Third, Study 3 indicated that mean levels of narcissistic admiration (i.e., a dimension of narcissism) remained relatively stable from age 20 to 30. Fourth, and finally, several life events were found to be related to individual differences in the development of narcissistic admiration over an 8-year time period. These findings suggest that some life events have a profound and long-lasting effect on the development of (at least some) narcissistic personality traits.

5.8 References

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