Inaugural-Dissertation

Gender Role Attitudes and Advice Taking: Aspects of Narcissism, Professional Contexts and Personal Situations

in der Fakultät Humanwissenschaften

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vorgelegt von

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Table of Content

Summary

The current dissertation sheds light on aspects of narcissism within different professional contexts and personal situations, and in relation to gender role attitudes and advice taking.

In the first chapter, the core concepts of narcissism, gender role attitudes and advice taking are defined and brought together with different professional contexts, e.g., managerial vs. non-managerial positions or STEM[1] vs. non-STEM fields, and different personal situations, e.g., having a daughter or having only sons or no children. The outline of the dissertation is then presented.

In the second chapter, the manuscript "Don't Tell Me What To Do! Narcissism and Advice Taking: A Meta-Analysis and Future Research Directions" is presented. We conducted a meta-analysis by integrating contradictory published and unpublished research and investigated whether narcissists are less likely to take advice than others, and further, if this is independent of the expertise of the possible advice giver. With different meta-analytic models, we found a small and stable negative correlation between narcissism and advice taking, but we did not find significant moderators. We then discussed theoretical and practical implications.

In the third chapter, the manuscript "Managers' Traditional Gender Role Attitudes: Diverging Relations with Admiration and Rivalry and the Daughter Effect" is presented. In this manuscript, the relationships between different dimensions of narcissism (i.e., admiration and rivalry) and gender role attitudes is examined in the professional context of management. The personal situation of having a daughter or only having sons or no children is also examined as both a main effect and as a moderator. As expected, admiration was negatively, and rivalry positively, related to traditional gender role attitudes. Partial support for the daughter effect was found. Theoretical and practical implications are discussed.

In the fourth chapter, the manuscript "Traditional Gender Role Attitudes in Science, Technology, Engineering, and Mathematics (STEM): Are STEM Managers More Modern Than Others?" is presented. In this manuscript, the presence of traditional gender role attitudes is examined in different professional contexts, i.e., in STEM vs. non-STEM fields. We also examined this in an exploratory manner in management vs. non-management positions. Overall, the results show that gender role attitudes are more traditional in men, older, non-managerial and non-STEM employees. Additionally, a gender gap was found. Implications are discussed.

In the fifth chapter, theoretical and practical implications are discussed and future research fields are outlined.

[1] Science, Technology, Engineering, and Mathematics

Manuscripts Embedded in this Dissertation

This dissertation is comprised of three manuscripts. All three manuscripts are embedded in this dissertation (chapters 2 to 4) and can be read independently of each other. The published versions are included. They have been corrected for typing errors and have been adapted in terms of formatting and headlines for a uniform layout. Electronic Supplementary Materials (ESM) for each manuscript can be found on the provided data carrier.

Manuscript 1:

Stöcker, A.-K., & Schütz, A. (2024). Don't tell me what to do! Narcissism and advice taking: A meta-analysis and future research directions. *Personality and Individual Differences, 223,* 112607. https://doi.org/10.1016/j.paid.2024.112607

Manuscript 2:

Stöcker, A.-K., Gauglitz, I. K., & Schütz, A. (2024). Managers' traditional gender role attitudes: Diverging relations with narcissistic admiration and rivalry and the daughter effect. *Journal of Personnel Psychology*. Advance online publication. https://dx.doi.org/10.1027/1866-5888/a000348

Manuscript 3:

Stöcker, A. & Schütz A. (2023). Traditional Gender Role Attitudes in Science, Technology, Engineering, and Mathematics (STEM): Are STEM Managers More Modern Than Others?. *International Journal of Gender, Science and Technology, 15*(3), 328-349.
https://genderandset.open.ac.uk/index.php/genderandset/article/view/1432

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CHAPTER 1: **GENERAL INTRODUCTION**

1.1 Defining Core Concepts

1.1.1 Narcissism

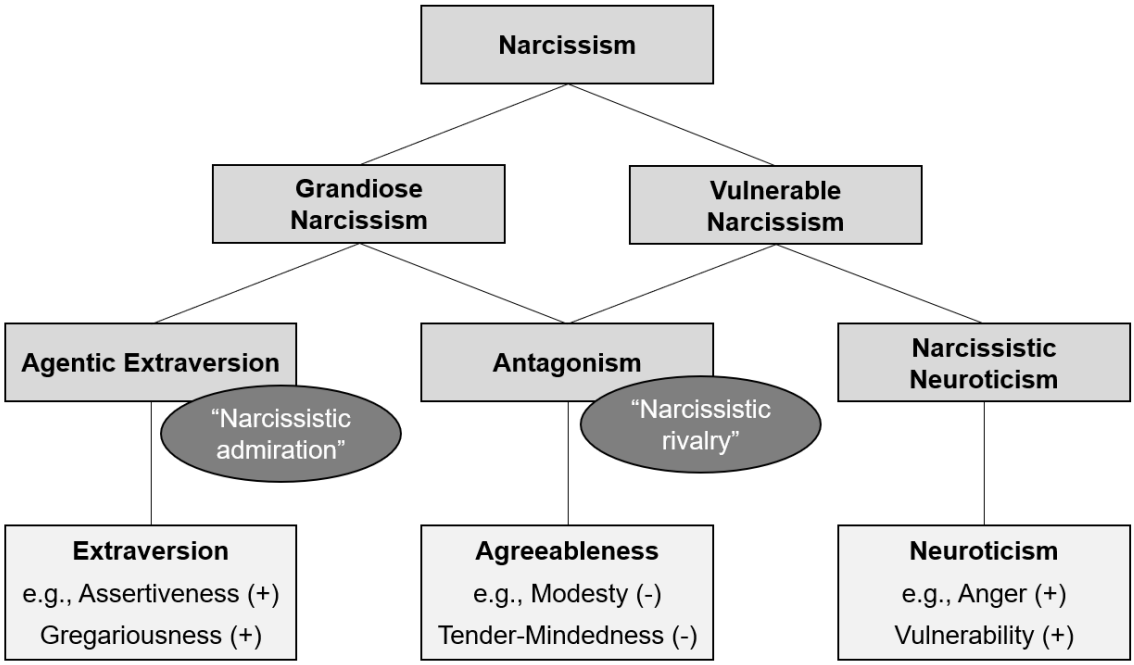
According to Ovid's Metamorphoses, Narcissus, a youth in Greek mythology, rejected all who adored him. He was finally punished when he fell in love with a person he could never reach. He looked into a puddle of water – "spem sine corpore amat, corpus putat esse, quod umbra est [he falls in love with a delusion: he takes for a person what is a shadow]" (Ovid, n.d., v. 417): Narcissus loved no one but himself.

The concept of narcissism has its roots in the ancient myth of Narcissus. Similar to its namesake, the concept of narcissism encompasses a spectrum of personality traits characterized by inflated self-perception, devaluation of others (Back et al., 2013), and a lack of self-reported empathy (Urbonaviciute & Hepper, 2020). In addition, narcissism correlates with low agreeableness, high extraversion, and high neuroticism (Weiss & Miller, 2018).

Following the hierarchical structure (see Figure 1.1) introduced by Miller et al. (2021), one can distinguish between grandiose and vulnerable narcissism. Grandiose narcissism is related to power orientation and manipulativeness (Wink, 1991), and has thus been the focus of narcissism and leadership research (Wirtz & Rigotti, 2020); grandiose narcissism is also the focus of this dissertation. Grandiose narcissism can be further divided into agentic extraversion and antagonism (Miller et al., 2021). In the Narcissistic Admiration and Rivalry Concept (NARC; Back et al., 2013), the former is represented by the dimension *narcissistic admiration*. As an underlying motivational dynamic, people high in narcissistic admiration pursue the maintenance of a grandiose self via assertive self-enhancement. They strive for uniqueness, follow grandiose fantasies, and can inspire excitement in followers through their charming behavior (Back et al., 2013). People high in *narcissistic rivalry*, the second dimension of the NARC, are motivated to maintain a grandiose self by antagonistic self-perception. They show belittling and aggressive behavior which can lead to social conflict (Back et al., 2013). The NARC has been widely adopted in research (e.g., Fehn & Schütz, 2020; Wurst et al., 2017) and serves as a starting point for the studies comprising this dissertation.

Figure 1.1

Hierarchical Structure of Narcissism and its Link to the Narcissistic Admiration and Rivalry Concept



Note. The upper three rows show narcissism as a unidimensional, two-dimensional and three-dimensional concept. The bottom row shows foundational traits that are related negatively (-) or positively (+) to the three dimensions of this concept of narcissism. The bubbles indicate the dimension of the NARC. Adapted from Miller et al. (2021)

Having discussed the hierarchical structure of narcissism, it is also important to introduce the idea of the so-called *narcissistic continuum*: In personality and social psychology, narcissism is viewed as a continuous dimension (Foster & Campbell, 2007). Thus, this definition implies that no cut-off value exists which would indicate the border between narcissists and non-narcissists. In other words, every person is narcissistic[2] to a greater or lesser extent.

The current dissertation builds upon narcissism as a multidimensional construct with continuous dimensions.

1.1.2 Gender Role Attitudes

Gender role attitudes are "opinions and beliefs about the ways that family and work roles do and should differ based on sex" (Harris & Firestone, 1998, p. 239). Gender role attitudes can vary widely across cultures (Boehnke, 2011) and

[2] When this dissertation refers to narcissists, the phrase is a simplification for people with high levels of narcissism.

historical periods (Cotter et al., 2011), and they influence behavior, e.g., career choices (Corrigall & Konrad, 2007; Dicke et al., 2019).

In terms of gender role attitudes, one can distinguish between role ascription, role conflict, and role segregation (according to a conceptualization by Walter, 2018). Role ascription refers to attitudes that assign appropriate roles to men or women[3] (Walter, 2018), e.g., "Having a job is the best way for a woman to be an independent person" (ISSP Research Group, 2013). Role conflict refers to conflict situations between different roles and how they are evaluated (Walter, 2018), e.g., "Children below the age of 6 suffer if their mother works" (Kantar Public, 2019). Role segregation describes the division of tasks in a couple (Walter, 2018), e.g., "It's best if the man and the woman work the same amount so they can share the responsibility for taking care of the family and household equally" (Kantar Public, 2019).

Traditional attitudes see the female role as the homemaker and the male role as the breadwinner (Corrigall & Konrad, 2007), but past and ongoing societal changes, including the third and fourth waves of feminism (Mohajan, 2022), are changing gender role attitudes (Bolzendahl & Myers, 2004). Yet, to date, gender role attitudes are not fully egalitarian (Cotter et al., 2011). The continuation of traditional attitudes may contribute to the underrepresentation of women in leadership positions, e.g., women fill only 23.2% of leadership positions in Germany (Andersen et al., 2023).

1.1.3 Advice Taking

Taking someone's advice means "do[ing] what someone suggests you should do" ("Take Someone's Advice," 2023), i.e., integrating the recommendations of others into one's decision making. This phenomenon is widespread in various areas of human life, from personal matters such as in relationships and health, to professional contexts such as within science and business.

In research on advice taking, the judge-advisor system is a very common study design (Sniezek & Buckley, 1995, 1989). The judge-advisor system is structured as follows: The judge (i.e., the person who ends up making a decision) makes an initial decision. Then the advisor gives advice, which may be experimentally defined (i.e., a random response from a previous participant) or the advisor may be instructed to advise as well as they can. The advisor's recommendation is then communicated to the judge, who then makes a new decision – the final decision, which may or may not be influenced by the advice (Bonaccio & Dalal, 2006).

[3] Research in the field of gender role attitudes, as well as related measures, build on heterosexual family models and a dichotomous gender concept. Because this dissertation uses existing panel data sets or existing primary studies, the only option was to use existing classifications, despite supporting the idea that that the gender binary needs to be replaced by a multiple-category conception of gender/sex that is based on diversity and multiplicity (Hyde et al., 2019).

Advice taking serves several purposes: improving judgment, sharing responsibility, and accepting help (Harvey & Fischer, 1997). Although a social component may play an important role in advice taking, as people sometimes accept advice just to avoid rejecting offered help (Harvey & Fischer, 1997), there is a robust phenomenon known as advice discounting (Yaniv & Kleinberger, 2000), in which decision makers underweight advice relative to their own judgment.

However, the extent to which advice is discounted or accepted depends on a variety of factors, i.e., situational factors, such as whether or not the advice was paid for (paid-for advice is used more often than free advice (Gino, 2008)), or individual factors, such as personality-related differences. Given the lack of research on these individual factors (Bonaccio & Dalal, 2006), narcissism as an individual factor influencing advice taking is one focus of my dissertation.

1.2 Bringing Together Core Concepts with Contextual and Situational Factors

1.2.1 Managers' Narcissism and the Consequences, i.e., in Gender Role Attitudes and Advice Taking

Previous research has shown that narcissists are more likely to occupy leadership positions than other individuals (Brunell et al., 2008). However, there is no conclusive evidence of a link between narcissism and effective leadership (Grijalva et al., 2015). Studies have shown that followers often suffer under narcissistic leadership (Nevicka et al., 2018). Recent research suggests that antagonistic narcissism can be particularly harmful in leaders. For example, narcissistic rivalry among managers has been linked to both a decline in the quality of leader-follower relationships, as well as a decline in follower professional engagement (Fehn & Schütz, 2020). In this dissertation, I focus on two areas where narcissism may influence managers' behavior: gender role attitudes and advice taking.

First, I will address narcissism and gender role attitudes. Conservatism, a more general concept involving gender roles, has been studied in relation to narcissism (Bardeen & Michel, 2019; Hatemi & Fazekas, 2018). The research on narcissism and conservatism does not show a clear relationship, when a one-dimensional narcissism concept is used. When narcissism is broken down into its underlying factors, however, the research is more revealing. The agentic aspects of narcissism are related to liberal attitudes (Hatemi & Fazekas, 2018; Zeigler-Hill et al., 2020), while the antagonistic aspects are related to conservative attitudes (Mayer et al., 2020; Zeigler-Hill et al., 2020). More specifically, a few studies in the general population found narcissism to be associated with sexism (Grubbs et al., 2014), traditional gender role attitudes (Hurlbert et al., 1994), and hostility toward heterosexual women (Keiller, 2010). Research focusing on managers has considered sociocultural factors, such as the extent of gender equality enforcing regulation (Parboteeah et al., 2008), but has not yet considered personality dimensions. This gap is addressed in Manuscript 2 of this dissertation.

Second, I will address narcissism and advice taking. Grandiose narcissism is defined by an inflated self-perception and devaluation of others (Back et al., 2013). To accept advice, one must consider the opinions of others and weigh them against one's own judgment. Taking the core definitions of narcissism and advice taking together, it would seem obvious that there should be a negative relationship between grandiose narcissism and advice taking (Kausel et al., 2015; O'Reilly & Hall, 2021). However, unpublished studies and data show conflicting results (McNamara, 2018; Schultze, 2018). Accepting advice is important, not only in daily life, but especially within a leadership role in an organization (Ciampa, 2006). When this is coupled with the fact that people with high levels of narcissism are attracted to leadership positions (Brunell et al., 2008), the relationship between narcissism and advice taking has not only theoretical but also practical implications. Clarifying this by using open science methods to conduct a meta-analysis was the goal of the first manuscript of this dissertation.

1.2.2 Gender Role Attitudes in the Context of Science, Technology, Engineering, and Mathematics (STEM)

Science, Technology, Engineering, and Mathematics (STEM) are fields with a low percentage of female employees, e.g., 17% women are employed in STEM fields in Germany in 2021 (Bundesagentur fuer Arbeit, 2023), 24% in the UK in 2019 (Statista Search Department, 2023), and 27% in the USA in 2019 (Martinez & Christnacht, 2021). Compared to men, women in STEM fields face more obstacles, such as feeling discriminated against and receiving less support in their organizations (Blackwell et al., 2009). Traditional gender role attitudes may be a contributing factor within this context.

At the beginning of a STEM career, selection processes may play an important role for the gender differences within the field: Men who adhere to established gender roles are more likely to pursue STEM careers (Sassler et al., 2017). Among male students studying STEM, stereotypes about men's higher math skills are more common than among female STEM and male non-STEM students (Moè et al., 2021). Among female students studying STEM subjects, stereotypes about women's lack of math skills and their chances of pursuing STEM careers are less prevalent than among women studying other subjects (Dunlap & Barth, 2019; Smeding, 2012). Women who held traditional gender role attitudes at age 16 or 18 were less likely to pursue STEM-related careers compared to other occupations (Dicke et al., 2019).

As people's STEM careers progress, socialization processes come into play. Women are in the minority in STEM fields, given the above-mentioned percentages, and so it follows that men in STEM have less exposure to female peers. Thus, the gender role attitudes of men in STEM can hardly be corrected, as a lack of exposure leads to the perpetuation of stereotypes (Dahl et al., 2018). Women also lack female socialization, so they are more likely to integrate into the male-dominated culture,

which can lead to both the perpetuation of stereotypes as well as the *queen bee phenomenon* (Staines et al., 1974), which is that women in positions of power prevent opportunities for junior women in organizations.

Overall, several selection and socialization processes influence gender role attitudes in STEM fields. As society is constantly changing (Mohajan, 2022), continued research is needed.

1.2.3 Having a Daughter as a Moderator

Life events can change a person's personality and attitudes (Bleidorn et al., 2018; Katz, 1960) and having a child is a major life event. The so-called *daughter effect* describes the idea that having a daughter is associated with more egalitarian attitudes (Shafer & Malhotra, 2011), not only among fathers but among parents more generally (Warner, 1991). However, it is not just attitudes that are affected. Having a daughter within CEO populations is also associated with greater pro-social ratings, i.e., of corporate social responsibility (Cronqvist & Yu, 2017), and pro-woman behavior, i.e., hiring women to the board (Dasgupta et al., 2018).

Most studies demonstrate a main effect of having a daughter as previously described. One explanation is that parents see that their daughter can benefit from gender equity (e.g., Warner & Steel, 1999). Another explanation is that parents develop a greater awareness of gender inequality because their daughter may share experiences of discrimination with them. Fathers may be more affected than mothers because mothers may have experienced bias themselves, which may limit the potential for awareness (Shafer & Malhotra, 2011). These explanations leave room for different variants of the daughter effect: Some studies find a daughter effect as soon as someone has at least one daughter (e.g., Warner, 1991). Other studies find this effect if someone's first born child is a daughter (e.g., Greenlee et al., 2020). Still other studies find that the more daughters someone has, the stronger the daughter effect is (e.g., Oswald & Powdthavee, 2010).

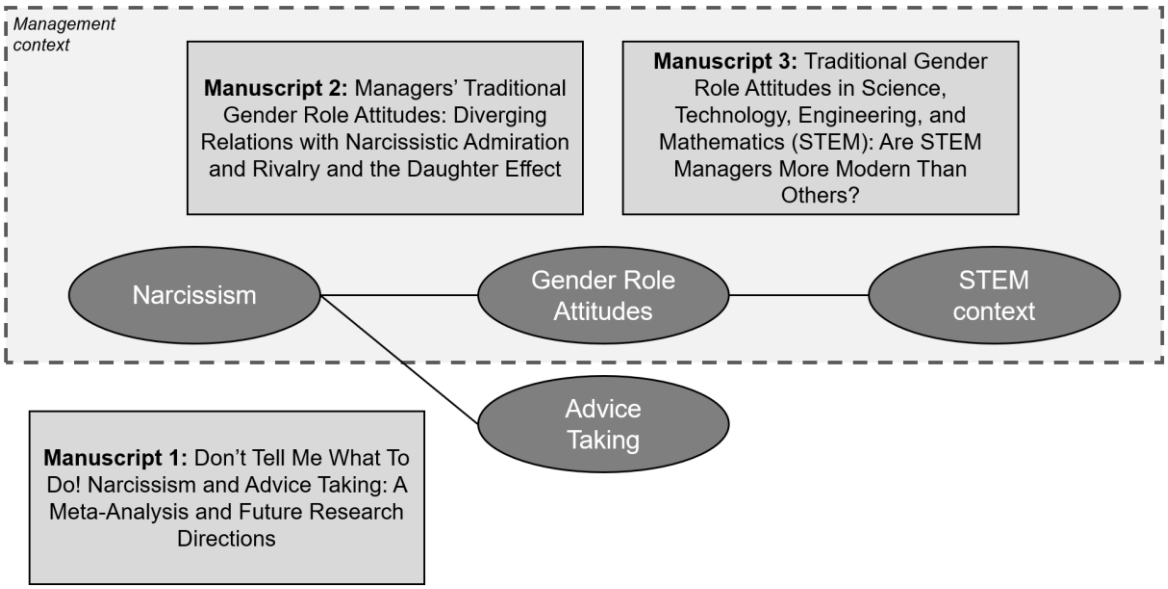
In this dissertation, I considered having at least one daughter to be potentially impactful in terms of a daughter effect. The effect of having a daughter was examined both as a main effect and as a moderator, particularly in terms of the relationship between narcissism and gender role attitudes. In Chapter 1.2.1, I described managerial narcissism and its consequences, such as on gender role attitudes. However, the relationship between personality and attitudes is not static, but rather moderated by the context in which these attitudes are formed and expressed. Contextual factors such as cultural norms or the social environment – e.g., having a daughter – can interact with personality and either strengthen or weaken the strength of the relationship between personality and attitudes.

1.3 Dissertation Outline

In this dissertation, I examine aspects of narcissism, different professional contexts, i.e., management or STEM fields, and personal situations, i.e., (not) having a daughter, in relation to gender role attitudes and advice taking. In addition, given the replication crisis and the open science movement in psychology (Open Science Collaboration, 2015; Shrout & Rodgers, 2018), I have contributed theoretically and methodologically to research through new publication formats with a strong methodological focus (e.g., Registered Report), pre-registration of all studies, and a meta-analysis. Embedded in this dissertation I present three manuscripts (see Figure 1.2) that can be read independently.

Figure 1.2

Overview of Manuscripts Embedded in this Dissertation



In the first manuscript, I investigated how narcissism is related to decision making and advice taking by conducting a meta-analysis of all existing research as well as unpublished findings. This work brought together previously contradictory or inconclusive evidence, primarily due to unpublished literature, to give more clarity to the relationship between narcissism and advice taking and discuss future research directions. This manuscript was published in Personality and Individual Differences.

In the second manuscript, the relationships between the antagonistic factor of narcissism, narcissistic rivalry, and the agentic factor of narcissism, narcissistic admiration, and gender role attitudes were examined. Further, we examined how the daughter effect plays a role as a moderator. Data from the Socio-Economic Panel (SOEP) were used which is representative of the German population. This work emphasizes the importance of distinguishing between dimensions of

narcissism. The manuscript was published in Journal of Personnel Psychology as a Registered Report.

In the third manuscript, managerial attitudes toward gender roles were examined that may affect support for and discrimination against women in STEM fields. Using data from the SOEP, we compared gender role attitudes in STEM and non-STEM fields. By running not only ordered probit regressions but also a multiverse analysis, we were able to demonstrate the robustness of the results. The manuscript was published in the special issue *Gendered Pathways: Identifying Barriers and Building Bridges to STEM Education and Careers* of the International Journal of Gender, Science and Technology.

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2

CHAPTER 2: **"Don't Tell Me What To Do! Narcissism and Advice Taking: A Meta-Analysis and Future Research Directions" (Manuscript 1)**

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Review

Don't tell me what to do! Narcissism and advice taking: A meta-analysis and future research directions

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ABSTRACT

In this meta-analysis, we investigated whether people with narcissistic traits are less likely than others to take advice. Additionally, we checked whether this would be independent of the advice giver's expertise and explored other potential moderators. Previously published and unpublished research has produced contradictory results, which motivated this pre-registered meta-analysis ($k = 11$, total number of participants = 2697) on the relation between narcissism and advice taking. We found a stable and robust, small, negative relation. Neither expertise of the advice giver nor other moderators were significant. We included robustness checks regarding participants, report characteristics, as well as operationalization of narcissism and advice taking. Theoretical, methodological and practical implications (for example, possible consequences of having people with narcissistic traits in positions of responsibility) are discussed and future research directions are outlined.

1. Introduction

The consideration of expert advice is typically viewed positively. Accepting others' expertise, however, also means having to adapt one's own opinion (Bonaccio & Dalal, 2006). A review by Bonaccio and Dalal (2006) noted that little was known about individual differences in advice taking. Since then, a few studies have addressed this issue and have found that individual differences can play a role.

Individual differences should be relevant to the question of whether or not one accepts advice because perceptions of both self and others play a role in this matter. Accepting advice was found to depend on (1) one's own expertise (See et al., 2011) or rather, as we assume, one's perceived expertise and (2) the perceived expertise of the advice giver (Birnbaum & Stegner, 1979; Bonaccio & Dalal, 2006). Given that narcissism has been associated with the tendency to overestimate oneself and underestimate others (Ames & Kammrath, 2004), this trait is likely relevant to advice taking. When screening published (Kausel et al., 2015; O'Reilly & Hall, 2021) and unpublished studies (McNamara, 2018; Schultze, 2018), however, we found diverging evidence.

Gray literature is "evidence not published in commercial publications" (Paez, 2017, p. 233). Including gray literature provides a comprehensive perspective on existing evidence (Bellefontaine & Lee, 2014) as long as the quality of the research is good. It reduces publication bias, which is the bias towards publishing mostly significant results. As far as we are aware, no attempt has been made to synthesize research on this topic in a manner which includes gray literature.

In the present study, we conducted a preregistered systematic review and meta-analysis on narcissism and advice taking. We also examined the expertise of the advisor as a potential moderator and explored participant and report characteristics as well as operationalizations of narcissism and advice taking as further potential moderators.

1.1. Narcissism and advice taking

Narcissism. Narcissism research has traditionally distinguished between grandiose and vulnerable narcissism. Grandiose narcissism is mainly characterized by tendencies such as self-enhancement (Grijalva & Zhang, 2016). Vulnerable narcissism is characterized by low self-esteem, shame, and anxiety (Weiss & Miller, 2018). It is also related to distrust (Krizan & Johar, 2015; Miller et al., 2010) and the tendency to view others' intentions as malevolent (Miller et al., 2011). Recent research has made further distinctions but classical scales of narcissism like the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979) do not include these more recent distinctions.

Advice Taking. When someone takes advice, they integrate others' recommendations into their own decision. Advice taking is commonly assessed with the so-called judge-advisor paradigm (Sniezek & Buckley, 1989; Sniezek & Buckley, 1995). The judge is the person who makes the

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decision and the advisor is the person who provides advice. In the typical experimental setting, the judge first makes a decision without advice and then receives information from the advisor. Typically, the judge receives a piece of information along with a note describing who the advisor was (for example, a previous participant or an expert on the matter). After having received the advice, the judge makes the final decision. Now, the researchers can calculate the weight that the judge gave the advice, that is, how much the final decision was influenced by the advice. Many, but not all studies included in our meta-analysis use this judge-advisor paradigm.

1.2. Narcissism and its relation to advice taking

Two published studies suggest that narcissism is negatively related to advice taking (Kausel et al., 2015; O'Reilly & Hall, 2021). This effect appeared to be mediated by an overestimation of one's own competence (O'Reilly & Hall, 2021) and a devaluation of the advisor's competence (Kausel et al., 2015). This is in line with the general plausibility of the idea that people with narcissistic traits are reluctant to accept advice. We thus collected, integrated, and synthesized published and unpublished data on the topic and tested the following hypothesis:

Hypothesis 1. Narcissism is negatively associated with advice taking.

While published research points to a small negative correlation between narcissism and advice taking, there is gray literature that provides different results. In fact, empirical results seem split, as unpublished data (Schultze, 2018) showed no significant correlation between narcissism and advice taking and a master's thesis (McNamara, 2018) reported a positive correlation between narcissism and advice taking. Thus, we think that the relation could be more complicated due to varying situational factors and facets of narcissism. People with narcissistic traits, especially those on the grandiose side, feel superior (Freis & Hansen-Brown, 2021) and want to show this. Thus, they may follow advice if they believe that this may help them to do well. For example, they may accept advice from an expert if they have little knowledge on the topic or if the context of advice taking is private. Thus, we think that under certain conditions people with grandiose narcissistic tendencies will be willing to take advice. By contrast, vulnerable narcissism could be related to low advice taking due to a general distrust of others (Krizan & Johar, 2015; Miller et al., 2010). If narcissism facets and situational factors are not distinguished, the overall relation between narcissism and advice taking could be an average effect that obfuscates the true and manifold associations between different shades of narcissism and advice taking in various contexts. Thus, we planned to distinguish facets of narcissism as a moderator. Additionally, we expected that advice would be more readily accepted in private and aimed to test privacy as another moderator.

As narcissism is related to underestimating others, we further assumed that the expertise of the advisor moderates the association between narcissism and advice taking. An early study showed that the advisor's expertise was positively associated with advice taking (Birnbaum & Stegner, 1979). Even if some studies mention the level of expertise of the advisor, we did not come across a systematic consideration of the source's expertise in research on advice taking and narcissism. In most of the studies, the participant is told whether the advisor has specific expertise on the matter, for example, the advisor may be described as a finance professor when the task involves finance. In other studies, there is no information on the advisor's expertise. We planned to distinguish level of expertise as another moderator.

On the one hand, people high in narcissism might feel threatened by others who offer advice, because they strive to be superior (Kong, 2015). This argument is in line with research showing that CEOs with narcissistic traits tended to act contrary to provided information (Zhu & Chen, 2015). Thus, we hypothesized:

Hypothesis 2a. The higher the source's described level of expertise, the stronger the negative association between narcissism and advice taking is.

On the other hand, we also considered the opposite relation: People with narcissistic traits tend to perceive other's competence as low (Kong, 2015), but at the same time they want to be perceived as intelligent (Zajenkowski et al., 2020). Thus, if a competent expert provides advice, they may see them as their equal and accept advice more readily than advice from others. Thus, the competing hypothesis is:

Hypothesis 2b. The higher the source's described level of expertise, the weaker the negative association between narcissism and advice taking is.

1.3. Further robustness checks on the relation between narcissism and advice taking

For a possible link between narcissism and advice taking to be generalizable, it should exist independent of participant and report characteristics as well as the specific operationalizations of narcissism and advice taking (for such an approach see Bücker et al., 2020; Körner et al., 2022). By testing these characteristics as moderators, we would be able to confirm a generalizable relation or figure out the reason for unstable results. Additionally, some of these aspects can be regarded as indicators of a study's quality.

Participant Characteristics. Regarding type of sample, we tested studies using panel participants against studies using students. Both groups are highly selective in their own way. Regarding mode of participation, we tested fully anonymous online studies against studies with in-person interaction, because direct interaction could increase concerns of self-presentation (Baumeister & Jones, 1978). To rule out cultural differences, we tested samples from Germany against those from the USA and other English-speaking cultures. Further, participant age and gender (Feng & MacGeorge, 2006) could affect willingness to take advice. Thus, we tested these two moderators. We also tested studies with incentivization against those without, because incentivization can affect effort in tasks (Camerer & Hogarth, 1999).

Report Characteristics. Publication status was tested (published in a peer-reviewed journal vs. gray literature) as significant results are more often published than others (Rosenthal, 1979). We also tested whether studies were preregistered, as preregistration prevents p-hacking (Simmons et al., 2021). Because paradigms and testing procedures may have shifted and participant attitudes could have changed (Twenge et al., 2008), we aimed to test year of data collection. Finally sample size, which affects significance, was tested.

Operationalization of Narcissism. With respect to measurement, we tested all scales against each other. The scales vary in their underlying definition of narcissism and in their focus, for example, they may focus on grandiose narcissism or may also include vulnerable aspects. We also tested the internal consistencies of the scales. Additionally, we tested studies that measured narcissism as a personality trait against studies that manipulated narcissism, as trait effects may be more stable and consistent than those which result from an experimentally induced state.

Operationalization of Advice Taking. If an effect only occurs with one specific operationalization, it cannot be generalized. Thus, we tested several specifications of advice taking experiments against each other. For example, advice could be more general or more specific. We tested numeric against other types of advice, because a specific number can function as an anchor (Röseler & Schütz, 2022). We also tested for the class of advice, that is, whether the answer was provided or information was given that helped the participant to find the right answer. Further, we distinguished whether the advice was a previous participant's answer or if it was the true score. Additionally, we tested measurement paradigms against each other: the Judge-Advisor-System (see Section 1.1), studies based on vignettes as options for decisions, and the "acquire a company" problem (Bazerman & Samuelson, 1983; Valley et al., 1998).

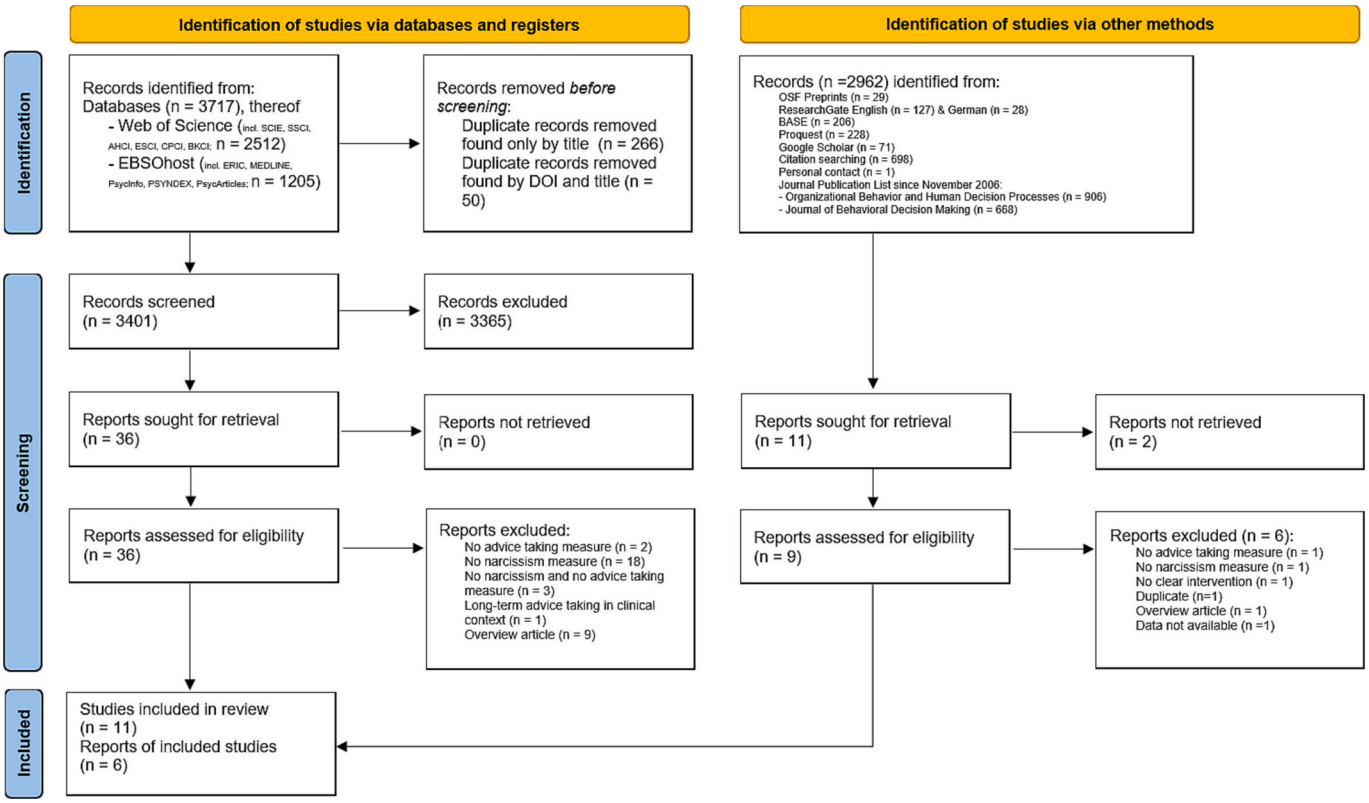

Fig. 1. Preferred reporting items for systematic reviews and meta-analyses flow diagram.
Note. PRISMA flow diagram based on Page et al. (2021).

Further, we tested types of measurements of dependent variables: One commonly used measure for the Judge-Advisor-System is the weight of advice (WOA), a proportion derived from numeric estimates (Harvey & Fischer, 1997). Other studies use adaptations of the WOA or categorical decisions as the dependent variable. We also tested the number of items used to assess advice taking, as results are more stable with a larger number of items. Importantly, people with narcissistic traits tend to cheat when confronted with challenges (O'Reilly & Doerr, 2020) and thus, a systematic error can occur if the study does not use preventive measures against cheating. Thus, we tested whether a measure to prevent cheating was implemented. If so, we distinguished between types of methods to prevent cheating. For example, prevention methods include conducting the testing in person, using specific task designs like estimating the weight of a person in a photo rather than asking a knowledge question, or eliminating suspicious participants afterwards. Further, we checked whether the inclusion of control variables made a difference, as results can be affected by the inclusion of control variables. We also tested how many control variables were included.

2. Methods

We preregistered the procedure, extraction rules and the code on https://osf.io/wfmr5. We mentioned all deviations from the preregistration throughout this paper. We shared all final procedures, materials, datasets, and code on the Open Science Framework [Enter final link]). The procedure is analogous to previous meta-analyses (Bücker et al., 2020; Körner et al., 2022). The reporting of methods and results in this paper is based on the template from Yeung et al. (2022).

2.1. Literature search

In July 2022, we searched eleven databases (see Fig. 1) via the interfaces Web of Science and EBSOhost and identified a sample of 3717 studies as illustrated in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram in Fig. 1. Boolean Logic operators such as "OR" and "AND" were used in the search pattern to connect narcissism and advice taking, resulting in the following main search string: *("dark core" OR "dark personality traits" OR "dark traits" OR "dark tetrad" OR "dark triad" OR ego* OR entitlement OR grandios* OR narcissis* OR rivalry OR admiration OR Narcissistic Personality Inventory OR NPI OR Narcissistic Admiration and Rivalry Questionnaire OR NARQ OR Communal Narcissism Inventory OR CNI OR Pathological Narcissism Inventory OR PNI OR Five Factor Narcissism Inventory OR FFNI OR Grandiose Narcissism Scale OR GNS OR Narcissistic Grandiosity Scale OR NGS OR Single Item Narcissism Scale OR SINS OR Unified Narcissism Scale OR UNS OR Dirty Dozen Inventory OR NSDD OR Short Dark Triad Scale OR SD3 OR Psychological Entitlement Scale OR PES OR Hypersensitive Narcissism Scale OR HSNS) AND (advice OR advis* OR judge advisor system OR JAS OR acquire a company problem).*[1] Adjusting for duplicates, a total of 3401 articles were initially identified and downloaded from the primary database search.

After that, a search for relevant research and data not listed in the primary database search via other methods was conducted in August 2022, as considered an essential part of a meta-analysis process to reduce the effect of publication bias and prevent overestimation of effect sizes (Feltz & May, 2017). We searched for papers or data sets listed under the OSF Preprints, ResearchGate, ProQuest and Google Scholar in English and German. Additionally, we conducted another round of searching by checking the reference sections of articles from our primary

[1] For Web of Science, the first part of keywords on narcissism were too many for one search. Thus, we applied two searches, one after the other, the first one with all keywords until *NPI*, the second one with all keywords starting from *Five Factor Narcissism Inventory*. The second part of the search string was identical in both searches.

Reference	Paper	Study	Sample	Effect Size
Kausel et al., 2015 – 1	1	1	1	1
Kausel et al., 2015 – 2	1	2	2	2
Kausel et al., 2015 – 3	1	3	3	3
Kausel et al., 2015 – 4	1	4	4	4
Kausel et al., 2015 – 5	1	4	5	5
Kausel et al., 2015 – 6	1	4	6	6
O'Reilly & Hall, 2021 – 7	2	5	7	7
O'Reilly & Hall, 2021 – 8	2	6	8	8
Schultze, 2018 – 9	3	7	9	9
Schultze, 2018 – 10	3	7	9	10
Schultze, 2018 – 11	3	7	9	11
Schultze, 2018 – 12	3	7	9	12
Schultze, 2018 – 13	3	7	9	13
O'Reilly et al., 2018 – 14	4	8	10	14
O'Reilly et al., 2018 – 15	4	8	10	15
O'Reilly et al., 2018 – 16	4	8	10	16
O'Reilly et al., 2018 – 17	4	9	11	17
O'Reilly et al., 2018 – 18	4	9	11	18
O'Reilly et al., 2018 – 19	4	9	11	19
Otterbring et al., 2021 – 20	5	10	12	20
McNamara, 2018 – 21	6	11	13	21
McNamara, 2018 – 22	6	11	13	22

Fig. 2. Overview on included studies.
Note. Numbers indicate the running numbers per paper, study, sample and effect size.

search. Additionally, we scanned journal publication lists since November 2006 from Organizational Behavior and Human Decision Processes and Journal of Behavioral Decision Making.

Furthermore, we identified eight authors in the field of the narcissism and advice taking literature. We searched through their publications and contacted them to ensure full coverage and maximize access to unpublished data and/or manuscripts that may be relevant (see Electronic Supplementary Materials, ESM 1). Lastly, we asked five professional psychology research associations to publish our call for unpublished papers (see ESM 1), resulting in publication of calls for papers in the mailing lists by German Society for Psychology, the Society for Judgment and Decision Making and the Open Forum of the Society for Personality and Social Psychology. Following these additional search procedures, we identified an additional 2962 records.

The lead author then scanned all titles and abstracts to identify the relevance of the sources. Of these articles, 47 indicated relevance for our analysis and we were able to retrieve 45 articles thereof in full. The full articles were read by the lead author and a research assistant independently to determine whether they met the inclusion and exclusion criteria (see paragraph 2.2 Inclusion and Exclusion Criteria) or whether articles had to be excluded. Of the 45 reports assessed for eligibility, 25 reports did not report measures of advice taking and/or narcissism, one report referred to long-term use of advice, ten reports were overview articles, one report did not include a clear intervention, one report was a duplicate, and for one report, the relevant data were not available (even after contacting the author). This screening reduced the number of included papers to six.

The reliability of the screening was good (Koo & Li, 2016), with a two-way absolute agreement intraclass correlation coefficient (ICC) of 0.79, 95 % CI [0.64; 0.88]. During a discussion of the two screeners, two studies were additionally excluded, leading to an excellent reliability of ICC 0.92, 95 % CI [0.86; 0.96]. After that discussion, the screeners still disagreed on one article. The disagreement was resolved by a discussion with the second author who decided to exclude the article.

We contacted authors of studies regarding missing data sets. If the original authors of the studies provided the data set but no results, the researchers conducted the analyses. We documented the relevant results in the coding sheet (see ESM 2), for an overview see Fig. 2. In total, we contacted six authors for the data from eight studies. All of them responded, and we were able to complete analyses for seven studies, which we included afterwards. All together the procedures led to the inclusion of six articles with eleven studies and with a total of 2697 participants.

2.2. *Quality of included studies*

A meta-analysis is meant to integrate similar or comparable studies of high quality. A focus on quality is especially recommended when including gray literature.

First, we established strict inclusion and exclusion criteria following the broadly recommended framework TOPICS-M (Johnson & Hennessy, 2019; see Fig. 3). We included only studies with human samples that examined short-term effects of advice taking. The outcome of interest of the study was to be the quantity of advice taken, measured, for example, as the weight of advice. The decision needed to be made immediately after advice was given. Experimental designs were of primary interest,

Time	short-term taking of advice; that is, directly after advice was provided
Outcome	quantity of advice taken; for example, weight of advice, if the JAS paradigm was used or a similar way of measuring advice
Participants	human samples
Intervention	advice had been given before the decision
Context	context-independent effects, for example independent of race, gender, geography
Study design	preferably experimental designs; for exploratory analyses, we will consider a wider range of designs
Moderators	1. Facet of narcissism 2. Source's described level of expertise *Participant characteristics* 3. *Type of sample 4. *Mode of participation 5. Culture of participants 6. Age 7. Proportion of females 8. Incentivization for correct answers *Report characteristics* 9. *Publication Status 10. *Preregistration 11. Year of data collection (or replaced by year of publication, if not specified in the paper) 12. *Sample size *Operationalization of Narcissism* 13. Scale of narcissism 14. *Manipulation of narcissism 15. *Internal consistency of narcissism scale[a] *Operationalization of Advice Taking* 16. Type of advice 17. Class of advice given 18. Actual source of advice 19. *Measurement of advice taking 20. Type of measurement of the dependent variable 21. *Number of items part of the advice taking measurement 22. Privacy of advice taking 23. *Prevention of cheating 24. Method of prevention of cheating 25. *Inclusion of control variables 26. *Number of control variables

Fig. 3. TOPICS-M Criteria.[a]
Note. To improve clarity, we made slight adjustments in the wording after preregistration. [a]Added after preregistration. * Quality indicator.

but we included all kinds of studies with an effect size (please note that the preregistration focused on experimental design, and we broadened this criterium to allow for higher coverage). We included a broad range of these moderators and did not exclude studies that did not provide information on all moderators. We adhered strictly to our criteria to ensure high quality in all studies included in our meta-analysis. For example, one study was excluded because it examined long-term effects of advice taking (von Cube, 1983).

Second, we included various moderators that are considered quality indicators in various ways. All of these quality indicators are marked with an asterisk in Fig. 3: The type of sample is a quality indicator, because one point of criticism for online panel data has been the quality

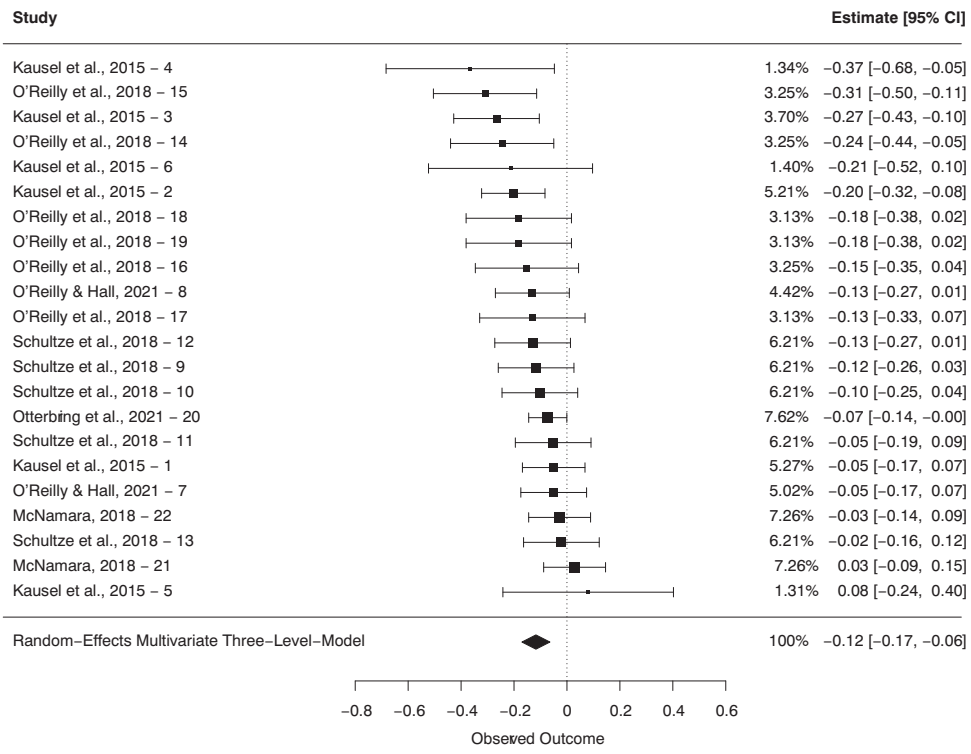

Fig. 4. Forest plot for model 1.

of answers (Hillygus et al., 2014). If participants do not read the advice but just answer randomly, and thus appear not to have accepted the advice, this would be a matter of quality. Regarding the mode of participation, in fully anonymous online studies participants may be less attentive to instructions than in studies with in-person interactions. Publication status (published vs. gray literature) is another quality indicator. The fact that published research involves peer review improves quality. During study design, preregistration is another quality indicator because it reduces the degrees of freedom that can be abused to conduct p-hacking (Simmons et al., 2021). Sample size provides further indication, as small sample sizes can lead to statistical fluctuation. Further, measuring narcissism as a personality trait (instead of manipulating it) could provide more stable and consistent effects. Additionally, the internal consistency of the scale is another variable that affects study quality. In regard to advice taking, the number of items used to measure the effect affects its stability. A further variable is whether an established paradigm was used. The prevention of cheating is another quality aspect: If, for example, judges cheat on their first decision by searching for the correct answer online, the possible variance induced by the advice is reduced. Research shows that people with narcissistic traits tend to cheat (O'Reilly & Doerr, 2020). Finally, the usage of multiple control variables without clear and compelling theoretical reasons (Bernerth & Aguinis, 2016), combined with a lack of preregistration, leaves the reader in doubt as to whether or not questionable research practices, for example p-hacking, had an impact on the reported findings.

2.3. Coding and reliability

We developed a data coding sheet and extraction rules based on two pilot studies to keep a clear record of our decisions at different stages and enhance reproducibility. The extraction rules were also preregistered.

After a full literature search, all studies were coded based on the extraction rules. A few adaptations to the extraction rules were made (as indicated in ESM 3). The lead author coded all of the eleven included studies. A research assistant double-coded 77 % of the materials. The interrater reliability after discussion was 99.6 %. We coded the included study information transparently, and the results of our coding process can be found in ESM 2.

2.4. Data analysis plan

We used RStudio with various packages for the statistical analyses, see ESM 4 for the code. To analyze the hypothesized main effect, we used three different approaches.[2] To account for dependence of effect sizes within the same articles, we calculated a random-effects multivariate three-level model, called model 1 (following Assink & Wibbelink, 2016). To also account for dependencies between the studies which were not fully captured by model 1, we also calculated a robust variance estimation, called model 2 (following Tanner-Smith et al., 2016). We conducted moderator analyses based on both models 1 and 2.

First, we calculated model 1 (random-effects multivariate three-level model). We plotted a forest plot presenting the effect size of each study. In our model, we assumed that individual effect sizes are nested within different studies. For analysis of moderators based on model 1, we ran a three-level mixed-effects model per moderator. We Fisher-z-transformed the correlations and standard errors as well as the continuous moderators. We dummy-coded the categorical moderators.

Second, we calculated model 2 (robust variance estimation) to account for additional dependencies that were not accounted for in the three-level model. For example, while we assumed in model 1 that there were dependencies at study level, there may have been further dependencies at the paper level, such as two different studies being conducted by the same authors. Robust variance estimation allowed

[2] We changed our preregistered approach after revisiting the data. We did not expect so many dependencies between the studies, for example, different measures of narcissism used on same data set. Thus, we needed to adapt our methods after literature search. We used more advanced and robust methods to account for higher dependencies in the data set.

Table 1
Results of moderator analysis for categorical moderators based on model 1.

Moderator	*k*	*N*	*r*	95 % CI	Diff	*p*
Facet of narcissism [a]						
Mixed	6	1193	−0.13	[−0.22, −0.04]		
Grandiose	16	2960	−0.11	[−0.09, 0.12]	0.01	.81
Source's described level of expertise [b]						
Low	13	2346	−0.11	[−0.19, −0.03]		
High	9	1807	−0.13	[−0.13, 0.09]	−0.02	.73
Type of sample [c]						
Students	9	1357	−0.09	[−0.20, 0.02]		
Panel	13	2796	−0.13	[−0.16, 0.09]	−0.04	.53
Mode of participation [c]						
Fully online	13	2796	−0.13	[−0.20, −0.06]		
Personality online, advice taking in person	9	1357	−0.09	[−0.09, 0.16]	0.04	.53
Culture						
Germany	5	955	−0.08	[−0.25, 0.09]		
USA	16	2455	−0.13	[−0.23, 0.13]	−0.05	.59
Other English speaking	1	743	−0.07	[−0.23, 0.25]	0.01	.10
Incentivization						
No	10	2546	−0.11	[−0.18, −0.04]		
Yes	12	1607	−0.13	[−0.14, 0.09]	−0.02	.67
Publication status						
Peer reviewed	7	1523	−0.05	[−0.14, 0.05]		
Gray literature	15	2630	−0.14	[−0.20, 0.02]	−0.09	.09
Preregistration						
No	17	3198	−0.12	[−0.18, −0.06]		
Yes	5	955	−0.09	[−0.13, 0.21]	0.04	.63
Scale of narcissism [d]						
NPI	12	2374	−0.11	[−0.18, −0.04]		
NSDD	3	705	−0.13	[−0.16, 0.11]	−0.03	.69
NARQ	2	382	−0.14	[−0.17, 0.10]	−0.03	.64
Resick	2	204	−0.15	[−0.22, 0.14]	−0.04	.65
Honesty-humility	2	204	−0.12	[−0.20, 0.16]	−0.02	.85
SD3	1	284	−0.12	[−0.20, 0.17]	−0.01	.90
Manipulation of narcissism						
No	20	3732	−0.10	[−0.15, −0.05]		
Yes	2	421	−0.23	[−0.27, 0.00]	−0.13	.05
Type of advice [e]						
Numeric	15	2798	−0.10	[−0.17, −0.04]		
Other	7	1355	−0.15	[−0.16, 0.07]	−0.04	.44
Class of advice [e]						
Information	7	1355	−0.15	[−0.25, −0.05]		
Answer	15	2798	−0.10	[−0.07, 0.16]	0.04	.44
Actual source of advice						
Previous participant	13	2346	−0.11	[−0.19, −0.03]		
True value	2	452	−0.09	[−0.14, 0.19]	0.02	.78
Experimentally designed answer	7	1355	−0.15	[−0.17, 0.09]	−0.04	.54
Measurement paradigm						
Judge-Advisor-System	14	2546	−0.11	[−0.19, −0.04]		
Vignettes	7	1355	−0.15	[−0.16, 0.09]	−0.04	0.56
Acquire a company problem	1	252	−0.05	[−0.15, 0.27]	0.06	.54
Type of measurement of the dependent variable						
Weight of advice	13	2346	−0.11	[−0.19, −0.03]		
Single decision	8	1607	−0.13	[−0.14, 0.11]	−0.02	.78
Adaptation of weight of advice	1	200	−0.13	[−0.25, 0.21]	−0.02	.86
Cheating prevention						
No	4	989	−0.13	[−0.24, −0.02]		
Medium	7	1485	−0.07	[−0.08, 0.21]	0.07	.37
Yes	11	1679	−0.15	[−0.16, 12]	−0.02	.78
Method of cheating prevention						
Testing in person	6	1233	−0.07	[−0.17, 0.02]		
No cheating possible	10	1479	−0.15	[−0.19, 0.05]	−0.07	.21
Elimination of suspicious participants	2	452	−0.09	[−0.17, 0.14]	−0.02	.84
Inclusion of control variables						
No	11	1567	−0.15	[−0.25, −0.06]		
Yes	11	2586	−0.10	[−0.07, 0.17]	0.05	.38

Note. *k* = number of outcomes; *N* = total number of individuals in *k*; *r* = pooled z-transformed correlation, CI = lower and upper limits of 95 % confidence interval.

[a] No studies found using scales of vulnerable narcissism, thus, this moderator category was excluded.

[b] Source's level of expertise is the moderator related to our preregistered hypotheses H2a and H2b.

[c] *Type of sample* and *mode of participation* form the same groups: All studies coded as *students* are also coded as *personality online, advice taking in person*, while all studies coded as *panel* are also coded as *fully online*.

[d] For the *scale of narcissism,* we distinguish between the NPI, narcissism subscale of Dirty Dozen measure (NSDD; Jonason & Webster, 2010), Narcissistic Admiration and Rivalry Questionnaire (NARQ; Back et al., 2013), Resick measure (Resick et al., 2009), Honesty-humility subscale of the HEXACO-60 (Ashton & Lee, 2009) and narcissism subscale of Short Dark Triad (SD3; Jones & Paulhus, 2014).

[e] *Type* and *class of advice* form the same groups: All studies coded as *numeric advice* are also coded as *advice that provides the answer*, while all studies coded as *other advice* are also coded as *advice through information*.

dependent effect sizes to be included in the same meta-analysis without knowing the covariance structure of effect sizes (Tanner-Smith et al., 2016). It additionally offered a correction for meta-analyses with a small number of included studies (Tipton, 2015), which we used. We applied correlated model weights, because we had multiple effect sizes estimated based on the same participant samples (Tanner-Smith et al., 2016). We calculated the main correlation with (r^+) and without (r) correction for measurement error (similar to Bücker et al., 2020). We Fisher-z-transformed the correlations and standard errors, dummy-coded the categorical moderators and centered the continuous moderators.

Null findings are less likely to be published (Begg & Berlin, 1988), resulting in biased published literature and a possible overestimation of effect size. To assess publication bias, we used different approaches. First, we analyzed the moderators *publication status* and compared published peer reviewed studies with gray literature, and *preregistered* vs. *not preregistered studies*. Second, we conducted funnel plots, trim and fill and an Egger's test for funnel plot asymmetry on study level (similar to Bücker et al., 2020; Körner et al., 2022). Third, we performed a PET-PEESE test.

3. Results

3.1. Model 1: three-level meta-analysis

The pooled z-transformed correlation based on Model 1, the three-level meta-analytic model, was $r = -0.12$, 95 % CI [−0.17, −0.06]. The estimated variance components were $\tau^2_{\text{Level 3}} = 0.003$ and $\tau^2_{\text{Level 3}} = 0.000$. This means that $I^2_{\text{Level 3}} = 36.6$ % of the total variation can be attributed to between-study, and $I^2_{\text{Level 2}} = 0$ % can be attributed to within-study heterogeneity. We found that the three-level model provided a slightly better fit compared to a two-level model with level 3 heterogeneity constrained to zero, when following AIC model selection ($\text{AIC}_{\text{three level}} = -34.6$ vs. $\text{AIC}_{\text{two level}} = -33.5$). As <75 % of the variance can be attributed to level 1 sampling variance, a moderator analysis is indicated (Hunter & Schmidt, 2004). The forest plot is presented in Fig. 4.

For the moderator analysis several distinctions were made. As preregistered, we differentiated between low and high expertise of the source of advice. We found six studies with low expertise, for example in the study from Kausel et al. (2015) the author framed the advice as the answers of a previous participant. Additionally, we found five studies with high expertise, for example in the study from Otterbring et al. (2021) the authors framed the advice as scientific estimates. As we did not find studies representing all variations, we were unable to test some of the moderators: we could not test against purely vulnerable narcissism as we did not find any study in that category to include. Additionally, we were not able to find variations on privacy, which is why we excluded it as a moderator.

Several different scales on narcissism were used. Eight studies used the NPI or short versions of it. Two studies manipulated narcissism. Only three studies did not prevent cheating at all, while in eight cases there were at least efforts to try and prevent cheating. Most of these studies used a design that did not permit cheating, for example in Study 2 by O'Reilly et al. (2018) an experimental setting based on a scenario was used, which does not allow for cheating. In other studies, such as Schultze (2018), the testing was conducted in person to prevent cheating. Only one study (Schultze, 2018) was preregistered. Eight studies did not provide any incentives for correct answers, while others paid participants small sums of money dependent on their performance, for example $2 in Study 2 by O'Reilly and Hall (2021). The moderator analysis based on model 1 revealed no significant moderators (see Table 1 for results regarding categorical moderators and Table 2 for results regarding continuous moderators).

Table 2
Summarized results of moderator analysis for continuous moderators based on model 1.

Moderator	β	95 % CI	p
Age	−0.01	[−0.07, 0.05]	.70
Proportion of females	0.00	[−0.07, 0.07]	.96
Year of data	0.02	[−0.02, 0.07]	.27
Sample size	0.03	[−0.01, 0.07]	.19
Internal consistency of narcissism scale	−0.01	[−0.05, 0.02]	.42
Number of items	0.02	[−0.05, −09]	.61
Number of control variables	0.01	[−0.04, 0.06]	.59

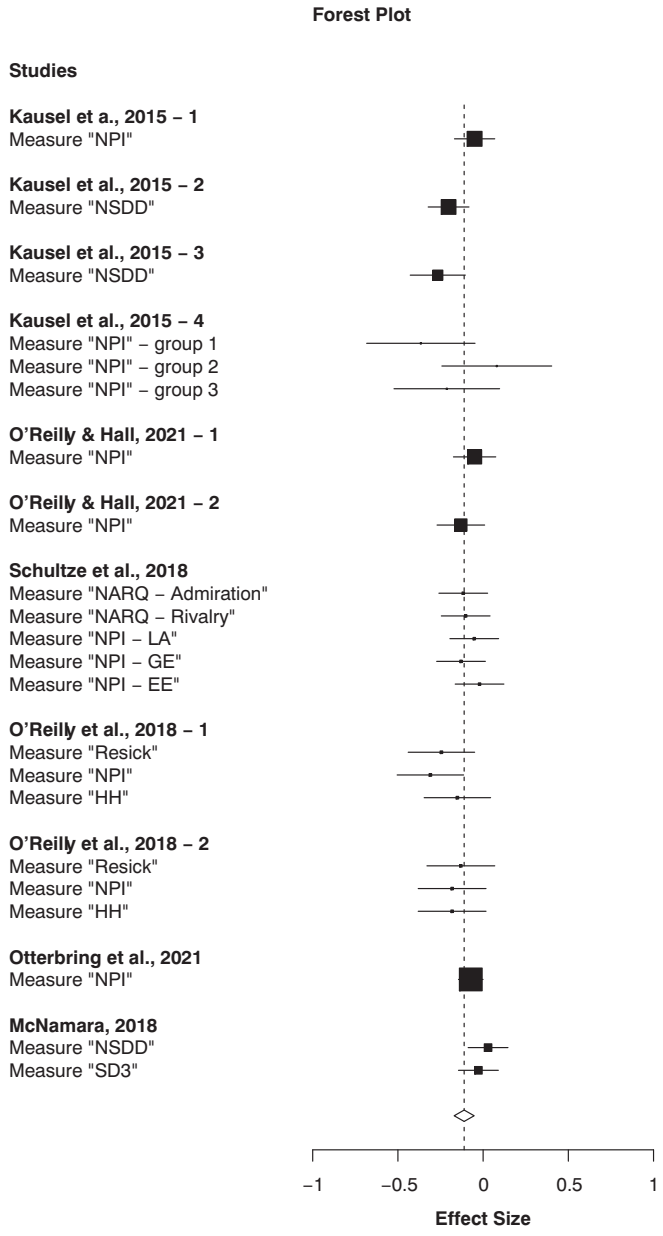

Fig. 5. Forest plot for model 2.

3.2. Model 2: robust variance estimation

The correlation that was pooled, z-transformed for measurement error corrected, and based on model 2 (the robust variance estimation) was $r^+ = -0.13$, 95 % CI [−0.19, −0.06]. Between-study heterogeneity was assessed as $\tau^2 = 0.004$, thus, $I^2 = 36.6$ % of the total variation can be

Table 3
Summarized results of moderator analysis for categorical moderators based on model 2.

Moderator	*j*	*k*	*df*	r	*95 % CI*	I^2	τ^2	*p*
Type of narcissism [a]								
Mixed†	5	6	3.8	−0.17	[−0.32, 0]	56.6	0.01	
Grandiose	8	16	4.4	−0.11	[−0.16, −0.06]	2.8	0	.57
Source's described level of expertise [b]								
Low	6	13	4.5	−0.13	[−0.26, 0]	58.0	0.01	
High†	5	9	2.5	−0.12	[−0.21, −0.02]	0	0	.96
Type of sample [c]								
Students†	3	9	1.3	−0.08	[−0.24, 0.08]	0.9	0	
Panel	8	13	6.4	−0.14	[−0.23, −0.05]	46.4	0	.34
Mode of participation [c]								
Fully online	8	13	6.4	−0.14	[−0.23, −0.05]	46.4	0	
Personality online, advice taking in person†	3	9	1.3	−0.08	[−0.24, 0.08]	0.9	0	.34
Culture††								
USA	9	16	7.2	−0.14	[−0.23, −0.05]	46.0	0.01	
Incentivization								
No	8	10	6.2	−0.12	[−0.21, −0.04]	45.5	0	
Yes†	4	12	2.6	−0.14	[−0.32, 0.05]	23.8	0	.56
Publication status								
Gray literature†	2	7	1	−0.04	[−0.56, 0.51]	15.5	0	
Peer reviewed	9	15	6.4	−0.15	[−0.22, −0.07]	28.8	0	.23
Preregistration of study ††								
No	10	17	7.7	−0.13	[−0.2, −0.06]	41.5	0	
Scale of narcissism [d]								
NPI	8	12	5.1	−0.12	[−0.18, −0.05]	21.4	0	.42
NSDD†	3	3	2.0	−0.15	[−0.52, 0.26]	82.4	0.02	.36
Resick†	2	2	1	−0.2	[−0.75, 0.51]	0	0	
Honesty-humility†	2	2	1	−0.19	[−0.4, 0.03]	0	0	.3
Manipulation of narcissism								
No	9	20	5.5	−0.09	[−0.14, −0.04]	7.6	0	
Yes†	2	2	1	−0.24	[−0.58, 0.17]	0	0	.09
Type of advice [e]								
Numeric	8	15	6.4	−0.12	[−0.21, −0.03]	45.2	0.01	
Other†	3	7	1.6	−0.15	[−0.44, 0.17]	31.4	0	.70
Class of advice [e]								
Information†	3	7	1.6	−0.15	[−0.44, 0.17]	31.4	0	
Answer	8	15	6.4	−0.12	[−0.21, −0.03]	45.2	0.01	.70
Actual source of advice								
Previous participant	6	13	4.5	−0.13	[−0.26, 0]	58.0	0.01	
True value†	2	2	1	−0.1	[−0.61, 0.46]	0	0	.66
Experimentally designed answer†	3	7	1.6	−0.15	[−0.44, 0.17]	31.4	0	.70
Measurement paradigm††								
Judge-Advisor-System	7	14	5.5	−0.13	[−0.23, −0.03]	50.2	0.01	
Vignettes†	3	7	1.6	−0.15	[−0.44, 0.17]	31.4	0	.70
Type of measurement of the dependent variable††								
Weight of advice	6	13	4.5	−0.13	[−0.26, 0]	58.0	0.01	
Single decision†	4	8	2.1	−0.12	[−0.25, 0.02]	15.3	0	.92
Cheating prevention								
No†	3	4	2.0	−0.16	[−0.49, 0.21]	77.3	0.02	
Medium†	3	7	2.0	−0.07	[−0.12, −0.02]	0	0	.12
Yes†	5	11	2.3	−0.14	[−0.29, 0.02]	9.6	0	.51
Method of cheating prevention								
Testing in person†	2	6	1	−0.07	[−0.3, 0.16]	0	0	.31
No cheating possible†	4	10	2.1	−0.15	[−0.35, 0.06]	30.7	0	
Elimination of suspicious participants†	2	2	1	−0.1	[−0.61, 0.46]	0	0	.88
Inclusion of control variables								
No†	3	11	1.9	−0.17	[−0.4, 0.08]	9.7	0	
Yes	8	11	6.2	−0.12	[−0.2, −0.04]	44.9	0	.47

Note. *j* = number of studies; *k* = number of outcomes; *df* = degrees of freedom; *r* = pooled z-transformed correlation, CI indicates the 95 % confidence interval; *p*-values indicate whether one category differed from the reference category.

† Corresponding *p*-values cannot be fully trusted because of small degrees of freedom (*df* < 4; Tipton, 2015).

†† RVE can only be calculated for categories with more than one study included. Thus, for the indicated moderators some categories were removed.

[a] No studies found using scales of vulnerable narcissism, thus, this moderator category was excluded.

[b] Source's level of expertise is the moderator related to our preregistered hypotheses H2a and H2b.

[c] *Type of sample* and *mode of participation* form the same groups: All studies coded as *students* are also coded as *personality online, advice taking in person*, while all studies coded as *panel* are also coded as *fully online*.

[d] For the *scale of narcissism,* we distinguish between the NPI, narcissism subscale of Dirty Dozen measure (NSDD; Jonason & Webster, 2010), Resick measure (Resick et al., 2009) and Honesty-humility subscale of the HEXACO-60 (Ashton & Lee, 2009).

[e] *Type* and *class of advice* form the same groups: All studies coded as *numeric advice* are also coded as *advice that provides the answer*, while all studies coded as *other advice* are also coded as *advice through information*.

Table 4
Summarized results of moderator analysis for continuous moderators based on model 4.

Moderator	*J*	*k*	*df*	*β*	*95 % CI*	I^2	τ^2	*p*
Age	10	19	2.8	0	[−0.02, 0.01]	42.6	0	.70
Proportion of females	9	17	3.6	−0.16	[−0.83, 0.70]	29.8	0	.68
Year of data	11	22	4.8	0.01	[−0.01, 0.04]	34.9	0	.24
Sample size	11	22	1.6	0	[−0.001, 0.001]	36.7	0	.54
Reliability	11	22	4.4	−0.3	[−0.82, 0.48]	37.1	0	.37
Number of items	11	22	1.2	0	[−0.002, 0.003]	41.8	0	.44
Number of control variables	11	22	3.4	0.01	[−0.03, 0.05]	42.4	0.01	.62

Note. j = number of studies; k = number of outcomes; df = degrees of freedom; β = regression coefficients out of the RVE meta-regressions; CI indicates the 95 % confidence interval; *p*-values indicate whether the continuous moderator is significant.

Table 5
Publication bias analyses.

Publication bias analysis method	Results and adjusted models
Trim and fill funnel plot asymmetry	Four studies missing on the right side, all within the non-significant range Adjusted model: $r = -0.07$, 95 % CI [−0.13, −0.01]
Egger's regression test	$z = -1.68$, $p = .09$
PET	$b = 0.00$, 95 % CI [−0.18, 0.19], $p = .94$
PEESE	$b = -0.07$, 95 % CI [−0.18, 0.04], $p = .15$

attributed to between-study heterogeneity. Without correction for measurement error, the pooled, z-transformed correlation was $r = -0.11$, 95 % CI [−0.17, −0.05]. Between-study heterogeneity was assessed as $\tau^2 = 0.003$, thus, $I^2 = 39.5$ % of the total variation can be attributed to between-study heterogeneity. Overall, the heterogeneity was between low and moderate (following the rule of thumb from J. P. T. Higgins et al., 2003), thus, a moderator analysis may be helpful (even if it was not strongly indicated). The forest plot is presented in Fig. 5.

The moderator analysis based on model 2 revealed no significant moderators either (see Tables 3 and 4).

3.3. Publication bias

Several different approaches were used to assess publication bias. First, we analyzed the moderators *publication status* and *preregistered* vs. *not preregistered studies* (see results in Tables 1 and 3). Neither moderator was significant. Second, we conducted funnel plots, trim and fill and an Egger's test for funnel plot asymmetry on study level (see Table 5 for results and Fig. 6 for a funnel plot with "filled" studies, estimated from the trim-and-fill analysis). Visual inspection indicated four missing studies on the right side in the non-significant range, indicating a publication bias. However, Egger's test showed that the present funnel plot asymmetry was not significant ($z = -1.68$, $p = .09$). This indicated that, even though there was an asymmetry in the published results, the asymmetry did not lead to a significantly biased result. Third, we performed a PET-PEESE test. Both PET ($b = 0.00$, $p = .94$) and PEESE ($b = -0.07$, $p = .15$) intercepts were not significant, however, this result should be interpreted with caution, as even though PET-PEESE is a very common test, it performs badly in meta-analyses with a small number of studies (Stanley, 2017).

4. Discussion

The present meta-analysis brings together published and unpublished findings on narcissism and advice taking. We analyzed facets of narcissism, privacy of advice taking and the source's level of expertise as moderators. As robustness checks and indicators of study quality, we also checked for possible effects of other moderators, such as participant and report characteristics as well as operationalization of narcissism and advice taking.

4.1. Narcissism and advice taking

Our results support a negative relation between narcissism and advice taking. Both models indicate a small but stable pooled negative correlation. Thus, the main hypothesis H1 is fully supported. Even though there is some evidence for bias in the published results based on asymmetric effect sizes, this asymmetry does not impact the small negative correlation in a meaningful way. The result fits well into the overall definition of grandiose narcissism and the picture of people with narcissistic traits as being arrogant (Miller et al., 2021), overestimating their own competence (Ames & Kammrath, 2004) and devaluing others (Back, 2018). However, the effect is small. All studies reported linear correlations, which could disguise stronger effects, for example for extreme or even pathological forms of narcissism.

4.2. Moderators: facets of narcissism, source's level of expertise and additional robustness analyses

Our results support neither a moderation effect regarding facets of narcissism and privacy nor a moderation effect of source's level of expertise. Thus, both hypotheses H2a and H2b are rejected. Our results also do not provide evidence for any other moderation. In this meta-analysis, sample and report characteristics as well as operationalization of narcissism and advice taking or indicators of study quality do not have a clear effect on the link between narcissism and advice taking. Thus, based on existing published and unpublished research, we can conclude that the relation between narcissism and advice taking is negative, small, and robust.

4.3. Implications

On the theoretical side, our meta-analysis summarizes published and gray literature in the field of narcissism and advice taking, and complements an existing meta-analysis on the measurement of advice taking (Bailey et al., 2022) as well as literature reviews on advice taking (Bonaccio & Dalal, 2006) by taking a deeper look at the personality determinants of advice taking, in this case, narcissism.

On the methodological side, our meta-analysis illustrates the importance of including gray literature in meta-analyses. Taking existing null results seriously, and integrating them into existing published results is crucial for open science practices. However, in our case, after integrating unpublished research that contradicted published results, the association remained as indicated by the published research. Thus, integrating this part of the literature showed the strength and robustness of the literature in this field.

On the practical side, our meta-analysis provides another piece of the puzzle as to whether or not it is harmful for people with narcissistic traits to hold positions of responsibility. Merely being in a powerful position itself seems to reduce willingness to accept advice (See et al., 2011). Even if one acknowledges that not all advice is helpful, it should be the quality of the advice, and not one's own personality that determines whether or not advice is accepted. Studies in the field of narcissistic leadership focus on problems in interpersonal relationships in leaders with narcissistic traits (e.g., Fehn & Schütz, 2020). Our results extend that view and are in line with the idea that problems caused by people with narcissistic traits go beyond interpersonal issues (Braun, 2017).

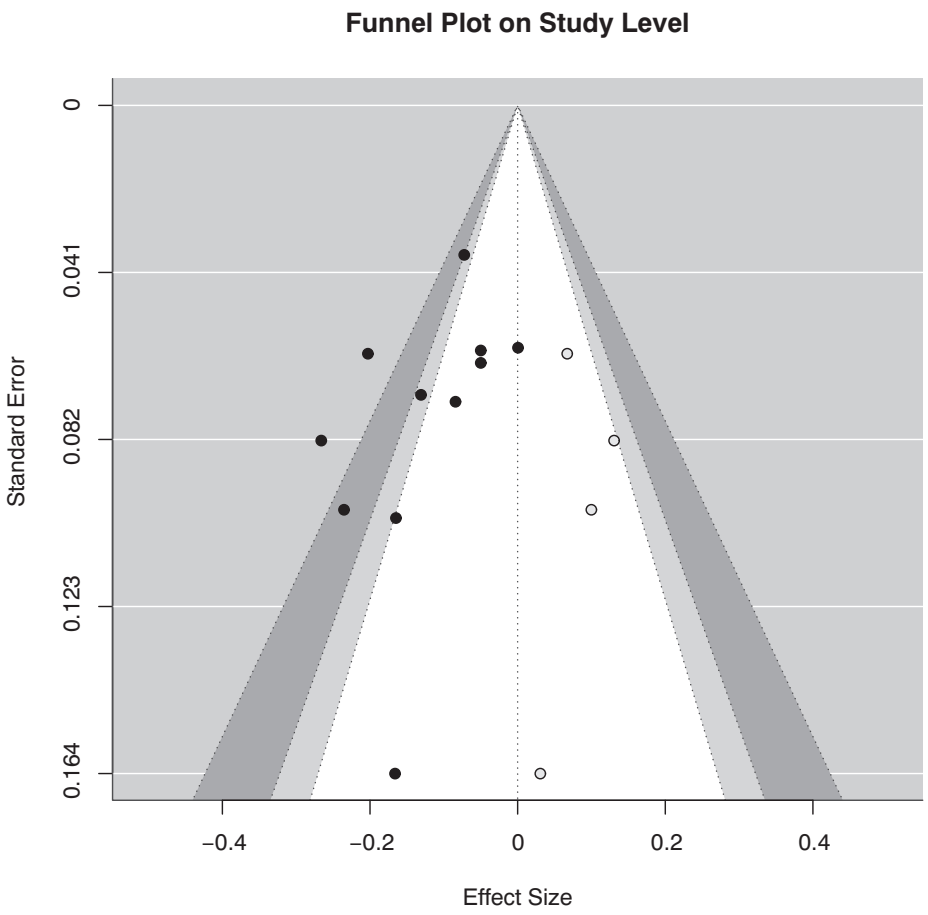

Fig. 6. Funnel plot with filled studies from the trim-and-fill analysis.
Note. Black circles indicate studies included in the meta-analyses. White circles indicate "filled" studies, which are missing to reach symmetric results. White area indicates non-significant area. Light gray indicates 95 % level, dark gray indicates 99 % level.

Narcissism, and the resulting reluctance to accept advice, may cause serious errors in decision making.

4.4. Limitations and future directions

We interpret the lack of evidence on moderating factors as an indication for a robust and stable, small, negative association between narcissism and advice taking. However, it is certainly possible that a more differentiated and broader set of studies would show evidence of moderation. We followed the rule of thumb of conducting moderator analyses with a minimum of 10 primary studies (Schwarzer et al., 2015), but other sources recommend including 40 or more primary studies (Viechtbauer et al., 2015). Based on our literature screening and meta-analysis, we recommend the following starting points for future research.

First, multidimensionality of narcissism: Most of the included studies use narcissism as a unidimensional construct. However, recent research views the construct as multidimensional and distinguishes three subdimensions of narcissism, which include: agentic (uniquely grandiose), antagonistic (vulnerable and grandiose mixed) and neurotic (uniquely vulnerable) narcissism (Miller et al., 2021). The agentic subdimension of narcissism is related to high self-assurance and assertive behavior (Back, 2018). By contrast, the antagonistic dimension is characterized by feelings of supremacy and a tendency to devalue others (Back, 2018). People high in narcissistic neuroticism are characterized by fragile self-esteem and shame (Miller et al., 2021). In our meta-analysis, only one unpublished study distinguishes between the agentic and antagonistic dimensions of narcissism and no study assesses the uniquely vulnerable subdimension of narcissistic neuroticism. Future research may aim at investigating possible distinctions between these variants of narcissism with regard to the tendency to accept advice. In addition to considering different dimensions, it may also be useful to look at both extreme and pathological forms of narcissism, as well as more common forms.

Second, while we see a stable and robust, small, negative association between narcissism and advice taking, we believe that under certain contextual circumstances (that have not been tested so far) there may still be room for variance. One contextual factor, for example, could be what is at stake for advice takers: Given the laboratory setting of all studies included, there was usually low or no incentivization for participants. People may behave differently if their own money, reputation or career success is at stake. This may be especially relevant for people with narcissistic traits who typically try to self-promote (i.e., in agentic narcissism) and defend their inflated self-views (i.e., high narcissistic neuroticism).

Another contextual factor is the public visibility of advice taking: All studies included in this meta-analysis conducted the advice taking process in privacy. There is an indication that people more extensively use advice in public than in private settings, for example in quiz shows (Lohre & Halkjelsvik, 2023). However, people with narcissistic traits strive to portray public images of competence (Collins & Stukas, 2008). This may result in a conflict for people with narcissistic traits: On the one hand, they would want to defend their inflated self-view and may need advice to make sure that they do not publicly fail. On the other hand, they may not want to publicly admit that they need advice. In line with the Dynamic Self-Regulatory Processing Model by Morf and Rhodewalt (2001), we think that the publicness of advice taking and responding

should matter. Given the narcissistic pattern of self-regulation, it is to be expected that a situation in which advice can be received privately and answers have to be provided publicly would increase advice taking in people with narcissistic traits. The contrary should be true if advice has to be taken in public and answers are provided in a more private or anonymous setting.

In addition, there may be more contextual factors one could think of in the context of narcissism and advice taking: Are other people affected by a decision? Is it a competitive situation, which should be especially relevant for the dimension of narcissistic rivalry? Can the advice taker lose or only win, in other words is self-promotion possible or self-protection warranted (E. T. Higgins, 1998)? What is the personal relationship between the advice taker and the potential advisor? Will the potential advisor know that the advice taker has used their advice? Is there an objectively correct answer or not?

Third, there are possible mediators: Some studies suggest that the negative relation between narcissism and advice taking may be mediated by an overestimation of the advice taker's own competence (O'Reilly & Hall, 2021) or their devaluation of the potential advisor's competence (Kausel et al., 2015). We were not able to meta-analyze this association, as there were not enough studies to do so, but it may be worthwhile to conduct further studies to gather evidence on such possible mediations.

We assume that, given the very stable and robust results, people with narcissistic traits typically tend to reject advice. However, contextual factors may moderate this association, that is, people with narcissistic traits may be more likely in some situations than in others to accept advice.

4.5. Conclusion

To conclude, our registered meta-analysis found substantial support for a small but stable negative correlation between narcissism and advice taking. Existing research does not provide evidence of any moderating effects, and the relation was very robust. There is room for future research, especially regarding contextual factors and multidimensional models of narcissism.

CRediT authorship contribution statement

Anna-Katharina Stöcker: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. **Astrid Schütz:** Conceptualization, Funding acquisition, Methodology, Project administration, Resources, Supervision, Validation, Writing – review & editing.

Declaration of Generative AI and AI-assisted Technologies in the Writing Process

During the preparation of this work the authors used ChatGPT and InstaText in order to improve readability and language. After using these tools, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Declaration of competing interest

The authors declared no potential conflicts of interests with respect to the authorship and/or publication of this article.

Data availability

We have shared the data and the code as part of the Electronic Supplementary Material.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.paid.2024.112607.

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CHAPTER 3: **"Managers' Traditional Gender Role Attitudes: Diverging Relations with Admiration and Rivalry and the Daughter Effect" (Manuscript 2)**

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Hybrid Registered Report

Managers' Traditional Gender Role Attitudes

Diverging Relations With Narcissistic Admiration and Rivalry and the Daughter Effect

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Abstract: Our study investigated gender role attitudes in narcissism. Using a representative data set (N = 2,850) from the Socio-Economic Panel (SOEP) in Germany, we examined how two narcissism dimensions (i.e., admiration and rivalry) are related to managers' gender role attitudes. We also expected that having a daughter is related to less traditional gender role attitudes (daughter effect) and tested whether having a daughter moderates the link between rivalry and traditional gender role attitudes, especially in fathers. Overall, as expected, admiration was negatively and rivalry positively related to traditional gender role attitudes. We also found partial support for the daughter effect..

Keywords: narcissistic leadership, narcissism, daughter effect, traditional gender role attitudes, panel data

The underrepresentation of women in leadership positions has been a topic of intense discussion, with gender quotas having a limited impact on the slow progress in some countries (e.g., Germany). The so-called *glass ceiling effect* refers to an invisible but powerful barrier that prevents women from advancing to higher management positions. It has been attributed to unequal treatment between genders, influenced, for example, by organizational gender culture, including traditional gender role attitudes (Babic & Hansez, 2021), and the personal attributes of executives who occupy positions above the glass ceiling. To overcome the glass ceiling effect, it is necessary to examine the factors that contribute to it. In this study, we therefore focus on managers' gender role attitudes. We define managers as individuals who hold a supervisory position and have at least two followers (see the Participants section). Consequently, we include a wide range of managers, some of whom supervise just a few employees, whereas others oversee a large group. Whereas it has been found that managers' gender role attitudes play a central role in the development of the glass ceiling effect (Babic & Hansez, 2021), it remains unclear which other personality factors of managers are associated with traditional gender role attitudes and which factors might act as buffers.

Studies have shown that many managers have traditional gender role attitudes, and these specific attitudes may in turn be rooted in more general traits (for a similar argument, see Soutter et al., 2020). One personality trait that has received a great deal of attention in management research lately is narcissism: Narcissists have a strong motivation to lead (e.g., Schyns et al., 2022) and indeed often emerge as leaders (Grijalva et al., 2015), but they often fail to be good leaders (e.g., Gauglitz et al., 2023). Narcissism is characterized by feelings of superiority and a tendency to devalue others (Back et al., 2013). As narcissism is linked to a tendency to rely on prejudice (Hodson et al., 2009), we expect it to also be linked to traditional gender role attitudes. Although existing research has shown that there is a link between narcissism and traditional gender role attitudes in general (e.g., Keiller, 2010), studies have yet to examine whether this association also holds for managers. This is important because managers occupy a special role and have extensive influence (e.g., in terms of who to promote). As managers not only often have the power to hire and promote people but also to lead by example (Yukl & Gardner, 2019), their attitudes may have an impact on the number of women in top positions and may contribute to a diverse and inclusive culture with a profound impact on organizational and societal levels (e.g., Konrad & Linnehan, 1992). Furthermore, previous studies have neglected the multidimensionality of the construct of narcissism, as they have focused on either only one narcissism dimension (entitlement, Grubbs et al., 2014) or narcissism as a whole (Keiller, 2010). It thus remains unclear how different narcissism dimensions are related to managers' gender role attitudes.

At the same time, research has shown that individuals' attributes moderate the association between narcissism and its manifestation in attitudes, behavior, or decisions (Arpaci et al., 2018; Zerach, 2014), as well as in managers (Cragun et al., 2020). We presume that one attribute that might moderate the association between managers' narcissism and gender role attitudes is whether the manager has a daughter. It has been shown that through this kind of socialization to girls/women, fathers begin supporting nontraditional gender roles (Shafer & Malhotra, 2011). Accordingly, we will test whether having a daughter is associated with traditional gender role attitudes, whether having a daughter moderates the association between managers' narcissism and gender role attitudes, and additionally, whether this association is stronger for fathers than for mothers.

Our contribution to the literature consists of three aspects: First, we will focus on managers to examine a group of people who have a strong influence on decisions in organizations (see Parboteeah et al., 2008, for a similar strategy), whereas prior research has focused on undergrads (Keiller, 2010), mTurk samples (Grubbs et al., 2014), or men who participated in a marital enrichment workshop (Hurlbert et al., 1994). To enhance generalizability regarding workplace issues and possible personnel decisions, a sample that matches the target population (here, the manager sample) will be more appropriate for the research question, and additionally, a replication with a new sample will be helpful for completing the scientific picture. Additionally, much research on managers' narcissism has relied on nonrepresentative convenience samples of high-profile managers (e.g., conference participants; Reina et al., 2014) and has faced the problem of a lack of availability of self-assessment measures, thereby mostly using outside-in measures of narcissism (e.g., indicators in publicly available documents, as in the CEO Narcissism Index; Chatterjee & Hambrick, 2007), which leaves room for improvement, as psychological-scale-based self-report methods provide unique insights into people's own personalities (Paulhus & Vazire, 2007). We present one of the few studies that we know of with a large and representative data set that includes a wide range of managers (i.e., ranging from having only a few to many personnel responsibilities), including managers' self-assessed narcissism.

Second, building on the Narcissistic Admiration and Rivalry Concept (NARC; Back et al., 2013), we distinguish between two dimensions of grandiose narcissism (so-called narcissistic admiration and rivalry) and thus consider the heterogeneity of the construct (Back, 2018). As these two dimensions are linked to distinct social strategies (Back et al., 2013), we argue that they may have different connections to gender role attitudes. This approach can provide completely new insights regarding the relationship between attitudes and narcissism as has been shown in other research fields (e.g., in peer relationships; Leckelt et al., 2020).

Third, we argue that personal attributes may also have an impact. It has been shown that other personal attributes (e.g., gender) can influence the associations between narcissism and attitudes, behavior, or decisions (Arpaci et al., 2018; Zerach, 2014) in managers (Cragun et al., 2020). Additionally, it has been shown that men with daughters have less traditional gender role attitudes (the so-called *daughter effect*; e.g., Shafer & Malhotra, 2011). Thus, we aim to connect the research strand on narcissism and traditional gender role attitudes with the strand on the daughter effect by testing for not only a main effect of having a daughter but also whether the association between narcissism and traditional gender role attitudes is moderated by having a daughter, especially for fathers. Before explaining our assumptions, we will briefly introduce the concept of grandiose narcissism.

Grandiose Narcissism

The construct of narcissism is widely discussed in public and is broadly defined. This paper focuses on grandiose narcissism as continuous nonpathological interindividual differences in the general population. Grandiose narcissism is characterized by power orientation and manipulativeness, which may lead to interpersonal problems (Wink, 1991). It is also positively related to extraversion and negatively related to agreeableness (O'Boyle et al., 2015). Recent models of narcissism consider different dimensions of grandiose narcissism that are associated with specific motivational and behavioral processes. The Narcissistic Admiration and Rivalry Concept (NARC; Back et al., 2013) distinguishes between two interrelated but distinct narcissism dimensions: *narcissistic admiration*, which describes a tendency to engage in assertive self-enhancement, and *narcissistic rivalry*, which is a tendency to engage in antagonistic self-protection (Back et al., 2013). According to the NARC, narcissists strive to maintain grandiose self-views but adopt different strategies to achieve this goal. Individuals high in narcissistic admiration behave in assertive and charming ways, strive for uniqueness, and possess grandiose fantasies, most often resulting in social success, which in turn boosts their grandiose self-views. Individuals high in narcissistic rivalry behave in antagonistic and aggressive ways, strive for supremacy, and devalue others, which typically results in social conflicts and can undermine their desired grandiose self-views. Thus, narcissistic admiration and rivalry are

associated with distinct inter- and intrapersonal processes. The NARC has been widely adopted (Wurst et al., 2017) and has been used in leadership research (e.g., Gauglitz et al., 2023).

Traditional Gender Role Attitudes and Narcissism

The few existing studies on antecedents of managers' traditional gender role attitudes (e.g., Parboteeah et al., 2008) have mostly focused on sociocultural factors (e.g., nation-level uncertainty avoidance, degree of regulation) as antecedents but have rarely taken personality into account. In the general population, research has shown a link between overall pathological and nonpathological narcissism and traditional gender role attitudes (Hurlbert et al., 1994). However, narcissism has been found to be a heterogeneous and multidimensional construct (Back, 2018), and there is only one subdimension that has been considered in research on narcissism and sexism so far: entitlement, which is a person's strong belief that they deserve more than others (Campbell et al., 2004) and is correlated with sexism (Grubbs et al., 2014). Given the multidimensionality of narcissism, further exploration of the associations between narcissism and sexism is warranted. We will do so by applying the NARC.

To further explore possible connections between subdimensions of narcissism and traditional gender role attitudes, we draw a parallel to research on narcissism and conservatism (as traditional gender role attitudes can be seen as one aspect of conservatism; e.g., Malka et al., 2019). In this stream of research, narcissistic admiration shows an association with liberalism, which may be due to its emphasis on individualism (Hatemi & Fazekas, 2018). By contrast, narcissistic rivalry shows an association with conservatism (e.g., Mayer et al., 2020), which may be due to the power motive and the narcissistic tendency to derogate others (Cichocka et al., 2017). In line with this reasoning, narcissistic admiration was found to be negatively correlated with right-wing voting and right-wing authoritarianism (Mayer et al., 2020), whereas rivalry had stronger positive correlations with right-wing authoritarianism than admiration did (Zeigler-Hill et al., 2021).

Thus, to draw the parallel with narcissism and traditional gender role attitudes, we hypothesize:

Hypothesis 1a: Higher narcissistic admiration is associated with less traditional gender role attitudes in managers.

Hypothesis 1b: Higher narcissistic rivalry is associated with more traditional gender role attitudes in managers.

Daughter Effect

Individuals' attitudes are influenced not only by personality but also by other attributes (Prislin & Wood, 2005). One such factor may be social relationships and family. For example, the fact that people who have a daughter tend to support gender equality more than others has been observed and has been termed the *daughter effect* (e.g., Warner & Steel, 1999). Research shows that the daughter effect exists, as soon as a person has at least one daughter (Oswald & Powdthavee, 2010). Thus, the simplified operationalization of "at least one daughter" has been used widely (e.g., Cronqvist & Yu, 2017). A recent focus on elite populations (e.g., CEOs) has revealed consistent positive effects between having a daughter and increased corporate social responsibility (Cronqvist & Yu, 2017). In fact, in companies in which a CEO has a daughter, more women have been hired into leadership positions (e.g., Dasgupta et al., 2018). We assume that these research results can also be applied to managers with a broader profile and therefore hypothesize a main effect of having a daughter:

Hypothesis 2a: Managers with at least one daughter have less traditional gender role attitudes than managers with only sons or with no children.

There are various explanations for the daughter effect. They are mainly rooted in the idea of socialization to girls/women. Parents may become more sensitive to gender inequality through the experiences a daughter shares with them. Moreover, they may change perspectives and see how their daughter can benefit from gender equity (e.g., Warner & Steel, 1999). These effects may be stronger for fathers than for mothers, as mothers may experience discrimination themselves, and thus, there may be less room for increased sensitization (e.g., Shafer & Malhotra, 2011). Additionally, we expect that having a daughter can magnify or diminish the effects of narcissistic rivalry on traditional gender role attitudes. We expect this effect only for narcissistic rivalry, as we assume room for sensitization in people who score high in narcissistic rivalry rather than in people scoring high in admiration, who, according to H1a, should score low on traditional gender role attitudes. Previously, a variety of manager attributes have been shown to moderate the relationship between narcissism and narcissistic behavior (for an overview, see Cragun

et al., 2020). In H2a, we expect managers with a daughter to have less traditional gender role attitudes and for this to counteract the direction of the association between narcissistic rivalry and traditional gender role attitudes. Thus, we hypothesize:

Hypothesis 2b: Having a daughter moderates the link between narcissism and gender role attitudes: The effect of narcissistic rivalry on traditional gender role attitudes is not as strong for managers who have at least one daughter.

As there is more room for sensitization for fathers than for mothers (Shafer & Malhotra, 2011), we further assume that this association may be stronger for fathers than for mothers. Thus, we hypothesize:

Hypothesis 2c: Having a daughter moderates the link between narcissistic rivalry and gender role attitudes more strongly for fathers than for mothers.

Additional exploratory hypotheses can be found in the Electronic Supplementary Material (ESM 1).

The Current Study

Method

Open Science

This paper is published as a Registered Report. We preregistered the manuscript on OSF after in-principle acceptance[1]: https://osf.io/wm4ux/?view_only=cff74ac212e24673af554b+Q3+514717270e.

Data Set

We used representative, multicohort survey data from the German Socio-Economic Panel (SOEP), focusing on the waves from 2017 to 2018. We used the latest available data set at the time when this paper was written (Liebig et al., 2021; DOI: https://doi.org/10.5684/soep.core.v36eu). Moreover, we used an additional SOEP data set that provides information about respondents' fertility histories (i.e., data about the birth dates of respondents' children) and is linked to the SOEP data via a unique identifier: the biobirth data set. Each year, the SOEP collects data from a representative sample of German households. As personal data, the SOEP data underlies special protections in Europe and cannot be published. Researchers can apply to use the SOEP data at https://www.diw.de/documents/dokumentenarchiv/17/diw_01.c.88926.de/soep_application_contract.583953.pdf.

Participants

As the SOEP does not ask every question every year, we combined the data from the 2017 and 2018 surveys. Using the data from 2017, we checked for management status. Management status is captured by the following items: (a) In your position at work, do you supervise others? and (b) How many people work under your direction? All other variables are part of the 2018 data set (for all items and response formats, see ESM 1, section 2). We included all participants who had not changed jobs since December 31, 2016 (to connect the data sets from 2017 to 2018) and who were in a supervisory position and had at least two followers (in line with prior research on teams defining a minimum number of two people as a team; e.g., Aubé et al., 2011). The total sample size was N = 2,850 with 37.5% women.

We adjusted our data by adding cross-sectional weights (Goebel et al., 2008) to ensure the representativeness of the German population.

As additional descriptive information about the participants, we used the number of employees, income, gender and employment in the public sector. The Ethics Board has approved the compliance to ethical standards.

Measures

Narcissism

Narcissism was measured in the data set with the six-item Narcissistic Admiration and Rivalry Questionnaire short scale (NARQ-S) on a six-point Likert scale, with three items for each dimension (rivalry and admiration; an overview of all variables, items, and response formats in the SOEP data set is provided in ESM 1, section 2). A typical item for narcissistic rivalry is "I want my rivals to fail," and a typical item for narcissistic admiration is "Being a very special person gives me a lot of strength" (Back et al., 2013). For the narcissistic admiration dimension of the NARQ-S, Cronbach's alpha was .77 (N = 2,850), and for narcissistic rivalry, it was .60 (N = 2,850). We excluded any participants with incomplete data on the NARQ-S.

Traditional Gender Role Attitudes

Traditional gender role attitudes were measured with three items as used by Hamjediers (2021): (a) Children below the age of six suffer if their mother works, (b) Children below the age of three suffer if their mother works, and (c) It's best if the man and the woman work the

[1] To stay within the overall word limit, we deleted some of the references from the Stage 1 report.

same amount so they can share the responsibility for taking care of the family and household equally (reverse-coded). We found a Cronbach's alpha of .62 (N = 2,850) for these items. We excluded any participant with incomplete data on the scale for traditional gender role attitudes.

Daughter Effect

We used the biographical data from the SOEP that indicate the gender of every person's child(ren). We used this information to calculate a binary variable called "at least one daughter." If a participant had incomplete data on this item, we excluded them from the analyses for H2a, H2b, and H2c (daughter effect hypotheses) but not from the other hypotheses.

Gender

We used the biographical data from the SOEP indicating male/female gender as a binary variable. This variable was used as a moderator in Model 2, which was designed to test H2a, H2b, and H2c. We excluded participants with incomplete data on gender.

Control Variables

We expect that age and gender may mask the statistical connection between narcissism and traditional gender role attitudes. First, there is evidence that narcissistic rivalry may increase over the life span (Grapsas et al., 2020). Moreover, we expect more traditional gender role attitudes among older participants (Lynott & McCandless, 2000). Additionally, the likelihood that a child (and a daughter) will have experiences that may be relevant to parents' gender role attitudes also increase as the child gets older. Second, men have higher scores on narcissism than women do (Grijalva et al., 2015), and this disparity holds for both dimensions of the NARC (Back et al., 2013). Men also hold more traditional gender role attitudes than women do (e.g., Brewster & Padavic, 2000). Thus, we included age and gender plus the Age × Narcissism, Age × Daughter, and Gender × Narcissism interactions as control variables in Model 1. As gender is a moderator variable in Model 2, we included age plus the Age × Narcissism and Age × Daughter interactions as control variables only in the second model. We used birthdates and interview dates to calculate the variable "age on interview day." We excluded participants with incomplete data on age.

Analyses

We computed our analyses with the R software (regression equations are provided in ESM 1, section 3; sensitivity analyses can be found in ESM 1, section 4).

Ordered Probit Regression With Narcissistic Admiration and Rivalry

We used an ordered probit regression model (for ordinal data; similar to Leder et al., 2021) to examine the effects of narcissistic admiration and rivalry on traditional gender role attitudes (to test H1a and H1b) in Model 1. In an additional moderator analysis, we added the binary moderator variable "at least one daughter" to test H2a, H2b, and H2c in Model 2.

Guidelines for the Interpretation of Results

We calculated both regression models (see analysis code in ESM 1, section 5) standardized and not standardized, with and without the control variable age and its interactions with narcissism and having a daughter. We were able to include weights and thus, have a representative data set. The weights were added to the registered analysis code. Furthermore, we interpreted the standardized analyses, including control variables (for other result tables, see ESM 1, section 6).

Results

Table 1 presents descriptive statistics and weighted correlations for all variables. To test H1a and H1b, we conducted an ordered probit regression model with

Table 1. Weighted means, standard deviations, and correlations

Variable	*M*	*SD*	1	2	3	4	5
1. Attitudes	3.42	1.48	—				
2. Admiration	2.56	1.13	.06**	—			
3. Rivalry	1.78	0.78	.07**	.40**	—		
4. Gender	0.37		−.24**	−.06**	−.14**	—	
5. Age	46.43	10.43	.07**	−.12**	−.08**	−.04*	—
6. Daughter	0.46		.00	−.03	−.03	−.08**	.22**

Note. N = 2,850. M and SD are used to represent weighted means and SDs, respectively. For dichotomous variables, M indicates the relative frequency. Age (in years) is a continuous variable. Admiration and rivalry are ordinally scaled (Likert scale, ranging from 1 to 6, with higher values indicating higher admiration and rivalry). Gender role attitudes are ordinally scaled (Likert scale, ranging from 1 to 7, with higher values indicating more traditional attitudes). Dichotomous variables are gender (male = 0, female = 1) and daughter (having no children or only sons = 0, having at least one daughter = 1).
*p < .05. **p < .01.

Table 2. Regression results of Models 1 and 2

	Dependent variable: Traditional gender role attitudes	
Variable	Model 1 β	Model 2 β
Admiration	−.01*** [−.01, −.01]	−.01*** [−.01, −.01]
Rivalry	.07*** [.07, .07]	.10*** [.10, .10]
Age	.01*** [.01, .01]	.005*** [.005, .005]
Gender	−.52*** [−.52, −.52]	−.50*** [−.50, −.50]
Daughter		−.03*** [−.03, −.03]
Daughter × Rivalry		−.05*** [−.06, −.05]
Age × Admiration	.001*** [.001, .001]	.001*** [.001, .001]
Age × Rivalry	.01*** [.01, .01]	.01*** [.01, .01]
Gender × Admiration	.16*** [.16, .16]	.16*** [.15, .16]
Gender × Rivalry	−.08*** [−.08, −.08]	−.16*** [−.16, −.15]
Age × Daughter		.005*** [.004, .005]
Gender × Daughter		−.05*** [−.06, −.05]
Rivalry × Gender × Daughter		.15*** [.15, .15]
Observations	7,947,685	7,947,685

Note. 95% CI in square brackets. As we use weights, weighted probit regression reports a high number of observations, but the actual sample size did not change.
*p < .10. **p < .05. ***p < .01.

Table 3. Regression results of the adapted Model 1 (parents of at least one daughter; individuals without children or with son(s) only)

	Dependent variable: Traditional gender role attitudes	
Variable	Daughter(s) β	No daughter β
Admiration	.01*** [.01, .01]	−.03*** [−.03, −.02]
Rivalry	.04*** [.04, .04]	.09*** [.08, .09]
Age	.01*** [.01, .01]	.005*** [.005, .005]
Gender	−.55*** [−.55, −.55]	−.51*** [−.51, −.51]
Admiration × Age	.002*** [.002, .002]	.001*** [.0005, .001]
Rivalry × Age	.02*** [.02, .02]	.01*** [.01, .01]
Admiration × Gender	.02*** [.02, .02]	.25*** [.25, .26]
Rivalry × Gender	.04*** [.04, .04]	−.19*** [−.19, −.18]
Observations	3,626,364	4,321,320

Note. 95% CI in square brackets. As we use weights, weighted probit regression reports a high number of observations, but the actual sample size did not change.
*p < .10. **p < .05. ***p < .01.

admiration and rivalry as predictors, traditional gender role attitudes as the outcome and the control variables age, gender, Age × Narcissism, Age × Daughter, and Gender × Narcissism (Model 1; see Table 2). For all analyses, we standardized variables (except for the dichotomous variables) and weighted our data for a representative data set. In line with H1a and H1b, higher admiration was linked to less traditional gender role attitudes (β = −.01, 95% CI [−.01, −.01]) and higher rivalry was linked to more traditional gender role attitudes (β = .07, 95% CI [.07, .07]).

Next, we conducted a moderator analysis using an ordered probit regression model to test H2a, H2b, and H2c (Model 2, see Table 2). In this model, we added the binary moderator variable "at least one daughter" and included age, Age × Narcissism, and Age × Daughter interactions as control variables. We found a significant main effect of having a daughter (β = −.03, 95% CI [−.03, −.03]). Thus, in line with H2a, managers who had at least one daughter had less traditional gender role attitudes than managers with only sons or those without children.

Moreover, results revealed a significant interaction term for Daughter × Rivalry (β = −.05, 95% CI [−.06, −.05]). In order to better interpret these results, we conducted additional analyses (which were not pre-registered). We split our data set into two subsets, with one containing managers with a daughter (subset 1) and one containing managers with only sons or no children (subset 2), and we ran Model 1 for each subset (see Table 3). We found that the positive relationship between rivalry and gender role attitudes was significantly stronger (as indicated by non-overlapping confidence intervals) in subset 2, the no daughter sample (β = .09, 95% CI [.08, .09]), than in subset 1, the daughter sample (β = .04, 95% CI [.04, .04]). Our data support H2b: The effect of rivalry on traditional gender role attitudes is weaker for managers who have at least one daughter than for other managers.

With regard to H2c, results of Model 2 revealed a significant interaction effect of Rivalry × Gender × Daughter (β = .15, 95% CI [.15, .15]). First, we tested whether the interaction effect of Rivalry × Daughter differed between fathers and mothers. We split our data set into subsets, with one containing managers who were fathers (subset 1) and

Table 4. Regression results of the adapted Model 2

	Dependent variable: Traditional gender role attitudes	
Variable	Mothers β	Fathers β
Admiration	.08*** [.08, .08]	.01*** [.01, .01]
Rivalry	.08*** [.08, .08]	.05*** [.04, .05]
Age	−.001*** [−.001, −.001]	−.004*** [−.005, −.004]
Daughter	−.14*** [−.15, −.14]	.02*** [.01, .02]
Daughter × Rivalry	−.03*** [−.04, −.03]	−.01*** [−.01, −.005]
Age × Admiration	−.01*** [−.01, −.01]	.002*** [.002, .002]
Age × Rivalry	.02*** [.02, .02]	.01*** [.01, .01]
Age × Daughter	.01*** [.01, .01]	.02*** [.02, .02]
Observations	1,770,248	3,444,514

Note. 95% CI in square brackets. As we use weights, weighted probit regression reports a high number of observations, but the actual sample size did not change.
*p < .10. **p < .05. ***p < .01.

Table 5. Regression results of the adapted Model 2

	Dependent variable: Traditional gender role attitudes			
Variable	Mothers of daughter(s) β	Mothers of son(s) only β	Fathers of daughter(s) β	Fathers of son(s) only β
Admiration	.03*** [.03, .03]	.23*** [.22, .23]	.01*** [.01, .02]	−.002 [−.004, .001]
Rivalry	.08*** [.08, .08]	.02*** [.02, .03]	.04*** [.04, .04]	.05*** [.05, .05]
Age	.01*** [.01, .01]	−.003*** [−.003, −.002]	.01*** [.01, .01]	−.002*** [−.003, −.002]
Admiration × Age	.004*** [.004, .005]	−.04*** [−.04, −.04]	.001*** [.0004, .001]	.01*** [.01, .01]
Rivalry × Age	.02*** [.01, .02]	.05*** [.05, .05]	.02*** [.02, .02]	−.01*** [−.01, −.01]
Observations	1,189,891	580,357	2,436,474	1,008,040

Note. 95% CI in square brackets. As we use weights, weighted probit regression reports a high number of observations, but the actual sample size did not change.
*$p < .10$. **$p < .05$. ***$p < .01$.

one containing managers who were mothers (subset 2). We ran an adapted version of Model 2 excluding the predictor gender and all of its interactions for the subsets (see Table 4) and found that the interaction effect of Rivalry × Daughter was significantly weaker in subset 1, the father sample (β = −.01, 95% CI [−.01, −.01]), than in subset 2, the mother sample (β = −.03, 95% CI [−.04, −.03]), contradicting H2c. Second, we again split each subset by differentiating between respondents with at least one daughter or only sons. This led to four subsets: subset 1 (mothers with at least one daughter), subset 2 (mothers with only sons), subset 3 (fathers with at least one daughter), and subset 4 (fathers with only sons). We then ran an ordered probit regression model (see Table 5) in each subset with admiration and rivalry as predictors, traditional gender role attitudes as the outcome, age and Age × Narcissism interactions as control variables. Among fathers, the relationship between rivalry and traditional gender role attitudes was stronger among those without a daughter (subset 4, β = .05, 95% CI [.05, .05]) than for those with at least one daughter (subset 3, β = .04, 95% CI [.04, .04]). Among mothers, the relationship between rivalry and traditional gender role attitudes was stronger for those with at least one daughter (subset 1, β = .08, 95% CI [.08, .08]) than for those with only sons (subset 2, β = .02, 95% CI [.02, .03]).

Discussion

We investigated the relationship between narcissism and managers' traditional gender role attitudes. Working with the NARC (Back et al., 2013), we aimed to clarify the association of two subdimensions of narcissism, admiration and rivalry, with traditional gender role attitudes. In addition, we investigated the potential influence of the daughter effect, i.e., whether having a daughter moderates the aforementioned relationship or is even directly associated with less traditional gender role attitudes. We used a large sample from the SOEP that is representative of the German population.

As hypothesized, managers high in admiration showed less traditional gender role attitudes than others. Our finding could be due to the fact that managers with high levels of admiration tend to promote themselves with future-oriented, innovative attitudes (Wisse et al., 2015) and display liberal attitudes (Hatemi & Fazekas, 2018). An alternative interpretation is that managers high in admiration like to emphasize progressive world views to show uniqueness and to boost their grandiose self-views.

Furthermore, managers with high levels of rivalry exhibited rather traditional gender role attitudes. This finding is consistent with research on narcissism and conservatism (Zeigler-Hill et al., 2021) and right-wing voting (Mayer et al., 2020). The striving for supremacy and the tendency to devaluate others (Back et al., 2013) may encourage the maintenance of traditional attitudes so as to maintain the prestige, social standing, and entrenched power structures on which the respective managers rely.

As hypothesized, managers who have at least one daughter showed less traditional gender role attitudes than managers who have no children or only sons. Thus, our data are in line with the idea of a daughter effect (e.g., Warner & Steel, 1999). When having a daughter, parents may become more aware of gender discrimination.

Having a daughter also served as a moderator: the association between rivalry and traditional gender role attitudes was reduced for managers who have a daughter. Previous research showed that people high in rivalry lack empathy (Burgmer et al., 2021). Having a daughter may compensate for this tendency by facilitating the understanding of women and their challenges.

We did not find that having a daughter moderates the association between rivalry and gender role attitudes more strongly in fathers than in mothers. Contrary to our expectations, the interaction between rivalry and having a

daughter was stronger for mothers than for fathers. For fathers with high rivalry scores, it mattered less whether they have a daughter than for their female counterparts. The relationship between rivalry and traditional gender role attitudes was weaker for fathers if they have a daughter than if they have only sons. For mothers, the relationship between rivalry and traditional gender role attitudes was stronger when they have a daughter than when they have only sons. This could be due to the fact that the daily life of a female manager changes more than a male manager's when she has a child. While fathers could have a child without missing one day at work, mothers are physically impacted by pregnancy and birth. Moreover, working mothers face gender stereotypes themselves, and may be perceived as a "bad parent" (Okimoto & Heilman, 2012). Thus, a female manager with both high levels of rivalry and a daughter may develop traditional attitudes in order to protect her daughter from the challenges of combining family and work.

Implications

The distinction between rivalry and admiration (Back et al., 2013) is useful in research on traditional attitudes as we found distinct relations between the two dimensions with respect to managers' gender role attitudes. The multidimensionality of the construct of narcissism should also be considered in other research areas, e.g., narcissism and other attitudes related to conservatism.

We found that rivalry was related to more traditional gender role attitudes, which in turn may contribute to the glass ceiling effect, as managers have power (e.g., in terms of personnel selection and promotion; Yukl & Gardner, 2019) and as their attitudes can affect the glass ceiling (Babic & Hansez, 2021). In contrast, we found that admiration was related to less traditional gender role attitudes; thus, we assume that such leaders will contribute less to a glass ceiling effect. Overall, our study joins other research showing that particularly high rivalry is problematic among managers, whereas admiration is not (e.g., Gauglitz et al., 2023).

Our study supports the idea of a daughter effect. However, we found no difference between women and men in this effect. We interpret the effect as being based on an increase in awareness of gender discrimination due to witnessing one's daughter's experiences and gender-specific treatment in society.

Limitations and Future Research

One limitation of the research is the use of short measures. Although the internal consistencies are acceptable, a more accurate estimate would be possible with the full measures. However, we would like to emphasize that the use of the full measure may lead to other problems, e.g., decrease in efficiency or likelihood of dropouts.

The daughter effect is not without controversy. Even though we found evidence for it in our study, other studies find null effects (e.g., Leder & Niszczota, 2022). These divergent empirical results may be explained by the lack of a theoretical basis for the daughter effect. We hope that our research can contribute to our understanding of the daughter effect and help to elaborate upon its theoretical basis.

Conclusion

With our study, we provide support for the assumption that managers' personalities are related to traditional gender role attitudes. Particularly, we found that managers' admiration was negatively related to traditional gender role attitudes, whereas managers' rivalry was positively related to traditional gender role attitudes. The latter effect was not as strong for managers who have at least one daughter as it was for managers who have only sons or no children, which provides partial support for the daughter effect. Thus, having a daughter might (at least in part) lead to a change in perspective and sensitize leaders regarding gender (in) equality. We did not find that the moderating effect of having a daughter was stronger for fathers than for mothers.

Electronic Supplementary Material

The following electronic supplementary material is available with this article at https://doi.org/10.1027/1866-5888/a000348

ESM 1. (1) Additional exploratory hypotheses, (2) measures, (3) regression equations, (4) sensitivity analyses, (5) final R code for data preparation and analyses, and (6) additional results tables

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CHAPTER 4: **"Traditional Gender Role Attitudes in Science, Technology, Engineering, and Mathematics (STEM): Are STEM Managers More Modern Than Others?" (Manuscript 3)**

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Traditional Gender Role Attitudes in Science, Technology, Engineering, and Mathematics (STEM): Are STEM Managers More Modern Than Others?

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ABSTRACT
The lack of women in Science, Technology, Engineering, and Mathematics (STEM) careers is a multifaceted problem, and there may be various levers for change (e.g., managers' attitudes). Whereas most previous studies have focused on educational aspects, we targeted later career stages: We measured managers' gender role attitudes because managers can be a source of support or discrimination. In fact, women in STEM fields report less support and more discrimination than STEM men or non-STEM women do. Using a large and representative data set from the Socio-Economic Panel (SOEP) in Germany, we compared traditional gender role attitudes in STEM versus non-STEM fields with ordered probit regressions and a multiverse analysis. We found that male, older, non-managerial, and non-STEM employees had more traditional gender role attitudes than others. Additionally, we found a gender gap: For men, older employees had more traditional gender role attitudes; for women, age did not matter, but female managers had less traditional gender role attitudes than non-managers. Reasons for this trend might be selection (e.g., women with traditional attitudes might abandon their careers earlier) or socialisation (e.g., female managers' attitudes may change in male-dominated environments). Implications for women's careers are discussed.

KEYWORDS
STEM; traditional gender role attitudes; panel study; manager; SOEP

Traditional Gender Role Attitudes in Science, Technology, Engineering, and Mathematics (STEM): Are STEM Managers More Modern Than Others?

INTRODUCTION

The lack of women in STEM (Science, Technology, Engineering, and Mathematics) careers is a multifaceted problem with various levers (Blickenstaff, 2005). Besides the women in STEM themselves, various other people are involved in the pipeline through which women enter STEM (e.g., parents, teachers, supervisors, managers). It was shown that perceived stereotypes lead women to consider dropping out of STEM careers (Clark et al., 2021), and an analysis of many reasons for the low retention rates of women in STEM jobs still showed unexplained variance (Glass et al., 2013). In a study of STEM-typical competencies rather than roles or attitudes, Glass and colleagues (2013) suggested that additional factors such as traditional attitudes of coworkers and supervisors could be relevant, as they may result in experiences of discrimination for women in STEM.

Theoretical background

Women in STEM fields tend to report more negative experiences than others. For example, STEM women were found to perceive their organisations as less supportive than STEM men and reported experiencing a larger amount of discrimination than both STEM men and non-STEM women (Blackwell et al., 2009).

One reason for such discrepancies could be the general gender imbalance in STEM combined with more traditional attitudes[1] of men in general. Less than 17% of the German STEM[2] workforce consisted of women in 2021 (Bundesagentur für Arbeit, 2023), and only 24% of the UK STEM workforce consisted of women in 2019 (Statista Search Department, 2023). In the U.S., 27% of the STEM workforce in 2019 were women (Martinez & Christnacht, 2021). Traditional gender role attitudes have been found to be more pronounced among men than among women (Brewster & Padavic, 2000; Toh & Watt, 2022). These include, for example, the attitudes that it is better for everyone if the woman takes care of the household, or that preschool-age children are likely to suffer if their mothers work outside the home (Toh & Watt, 2022). Overall, more men work in STEM, and men in general have more traditional gender role attitudes than women do.

We see two processes that apply specifically to men pursuing STEM careers up to the management level. The first is (self-)selection: Past research showed that male STEM students are more likely to believe that men are better than women in mathematics, sports, navigation, and construction in comparison to female STEM students and male non-STEM students (Moè et al., 2021). Moreover, men with more traditional gender role attitudes more frequently ended up in STEM fields than other men with less traditional attitudes (Sassler et al., 2017). Even though this finding does not speak to causality, it may indicate that stereotypes and traditional attitudes play a role in both study and career choices among men. However, as society is changing rapidly (Mohajan, 2022), such attitudes may have shifted towards greater gender equality.

The second process is a lack of socialisation due to STEM men's lack of exposure to female colleagues, which ties into the argument that men are self-selected into STEM jobs: Men who do not work with women on a daily basis might not consider the problems of discrimination and stereotyping an issue. Given the abovementioned small percentages, women are a minority in STEM fields, and men in such fields do not encounter many women in their daily work lives. For a similar logic, see the argument of the female socialisation hypothesis in research on the so-called daughter effect: Fathers are especially likely to become more sensitive to gender inequity through the experiences a daughter shares with them (Shafer & Malhotra, 2011). If men do not have a daughter, they may miss out on the opportunity to become more sensitive to gender inequity. Similarly, if men are not in contact with female employees in their daily work environment, they might not have the opportunity to become more sensitive to gender inequity in the workplace. Such processes may be reinforced over the years in a STEM career on the way to a management position.

STEM-specific selection and socialisation processes apply not only to men in STEM but also to women. However, such processes may have different outcomes for women.

The first possibility is (self-)selection: Women with traditional gender role attitudes may follow their ideas about which occupations offer a good fit for women and might therefore not choose STEM occupations. Research at the (pre-)college stage showed that women with traditional gender role attitudes at age 16 or 18 were less likely to work in STEM occupations than in other occupations (Dicke et al., 2019). In fact, stereotypes regarding women's high emotionality, lack of ability to have a science career, and low math competencies have been found to be less pronounced in college women studying STEM subjects than in women studying other subjects (see Dunlap & Barth, 2019; Smeding, 2012). These differences may still persist, and when women get promoted to management positions, this discrepancy may perpetuate.

However, there is a second possibility. It is possible that low numbers of women in STEM may promote the queen bee phenomenon: Women pursuing a career in a male-dominated work environment tend to assimilate to the male culture and may distance themselves from other women (Ellemers et al., 2012; Staines et al., 1974). One consequence of this phenomenon is that "queen bees" might perpetuate stereotypes in the organisation (Derks et al., 2016). Thus, women in STEM may hold more traditional attitudes than those in other fields.

The present study

Our contribution to the literature is the following: First, we focus on a later stage in women's careers than previous research. There is already ample research on the relationship between STEM-related stereotypes held by parents and teachers and women's decisions to major in STEM fields (e.g., Ikkatai et al., 2019), as well as women's performance and interest in STEM fields (Gunderson et al., 2012). We aim to shed light on a later stage by asking: "Do managers hold stereotypes that may act as a barrier to women's careers?" Second, we focus on managers. In a previous study, male STEM managers tended to be more implicitly gender biased in their hiring decisions than female STEM managers (Friedmann & Efrat-Treister, 2023). As managers are people who contribute significantly to their employees' careers (e.g., through selection/promotion),

their attitudes are a potential barrier that is exogenous to the women themselves. Thus, we focus on this exogenous factor to reduce barriers in women's STEM careers. Third, we focus on quantitative comparisons between STEM and non-STEM fields, whereas previous studies have primarily identified barriers on the basis of qualitative studies and have not addressed potential differences between STEM and non-STEM fields (e.g., Chapple & Ziebland, 2018). Quantitative studies can help us understand the strength of associations in addition to their existence. Thus, we provide effect sizes to advance an overview of associations between STEM, gender, and traditional gender role attitudes.

Building on our literature review, we tested the following hypotheses:

H1) In STEM managers, traditional gender role attitudes are more pronounced than in non-STEM managers.
H2) In male managers, traditional gender role attitudes are more pronounced than in female managers.
H3) In male non-STEM managers, traditional gender role attitudes are less pronounced than in male STEM managers.
H4) Traditional gender role attitudes differ between female STEM and non-STEM managers.

METHOD

Data set

The study's data came from the German Socio-Economic Panel (SOEP). The multicohort panel study relies on a survey administered to over 30,000 people each year. We focussed on two of the waves of data that were collected once per year in 2017 and 2018, released as part of the latest available data set (Giesselmann et al., 2019; DOI: https://doi.org/10.5684/soep.core.v37eu). All the variables we retrieved are listed in Appendix A. Special protections apply to personal data in Europe; thus, the publication of SOEP data is prohibited. However, access to the data is granted to researchers via https://www.diw.de/documents/dokumentenarchiv/17/diw_01.c.88926.de/soep_application_contract.583953.pdf.

Participants

The SOEP does not ask the same questions every year, so data from different waves were needed to select participants. Most of the data we used came from the 2018 wave. We determined management status using the previous year's data because this information was not collected in 2018. Therefore, we were able to include only individuals who did not change jobs in the meantime and were part of the SOEP sample in 2017 and 2018. Thus, the total sample size was N = 10,101, including N = 2,917 managers and N = 7,184 non-managers. We classified participants as managers if they were in a supervisory position and had at least two employees reporting to them. In the manager subsample, we found 12.3% working in STEM (non-manager sample: 9.0%) and 37.4% women (non-manager sample: 57.1%). More detailed sample sizes are attached in Appendix B.

By applying cross-sectional weights, our results were representative of the German population (Goebel et al., 2019).

Measures

Traditional gender role attitudes

The three-item scale for traditional gender role attitudes had already been used by Hamjediers (2021). The items were (a) "Children under age 6 suffer when their mother works," (b) "Children under age 3 suffer when their mother works," and (c) "It is best for the husband and wife to work equally so that they can share family and household responsibilities equally" (reverse coded). In our manager sample, the scale had a Cronbach's alpha of .64 (N = 2,917). In the total sample, including non-managerial employees, the scale had a Cronbach's alpha of .61 (N = 10,101).

STEM versus non-STEM

We coded the current occupations as STEM or non-STEM. The SOEP provides information on occupations on the basis of the International Standard Classification of Occupations (International Labour Office, 2012). The coding rules (see the Electronic Supplementary Materials ESM 1) we developed were based on the definition of STEM from the Standard Occupational Classification System (SOC; the definition of STEM can be found here: https://www.bls.gov/soc/Attachment_B_STEM.pdf). Because, to the best of our knowledge, there is no existing way to match the SOC and the ISCO-08 on the most detailed occupation level, we defined the coding rules (as attached to the preregistration) on the basis of the SOC STEM definition and applied the rules to the ISCO-08 system. The first author coded all 436 occupation groups of the ISCO-08 (for the results of the coding, see Electronic Supplementary Materials ESM 2), and 10% of the material was independently coded by a second coder. Interrater reliability was 100% (Cohen's kappa).

Control variable: Age

In general, younger people have less traditional gender role attitudes (Lynott & McCandless, 2000; Sweeting et al., 2014). Age is also related to job experience and therefore to the likelihood of being a manager. As age is correlated with both the dependent and independent variables, we included it as a covariate.

Analyses

Software

Our analyses were computed with the R software version 4.0.2 (R Core Team, 2020). Additionally, we used the following packages: apaTables (Stanley, 2021), brant (Schlegel & Steenbergen, 2020), lubridate (Grolemund & Wickham, 2011), MASS (Venables & Ripley, 2002), psych (Revelle, 2022), radiant.data (Nijs & von Hertzen, 2023), rstatix (Kassambara, 2021), sensemakr (Cinelli et al., 2021), stargazer (Hlavac, 2022), tidyverse (Wickham et al., 2019), Weighted.Desc.Stat (Parchami, 2016), and weights (Pasek et al., 2021). We preregistered the plans for our analyses (see https://osf.io/65ztp/?view_only=8511f2e4001c47acb04e0e0c8a3a4428). The following adaptations were made to our preregistration: First, at the suggestion of a reviewer, we have combined two competing pre-registration hypotheses into what is now the new Hypothesis 4. Second, we have added additional methods of analysis to the preregistered ordered probit regression, resulting in a multiverse analysis which ensures the robustness of our results. The final analysis code can be found in the Electronic Supplementary Materials ESM 3.

Multiverse analysis
Traditional gender role attitudes were assessed with a Likert scale, and thus, ordinal data. Ordered probit regression models based on the median were computed (similar to Leder et al., 2021). We found unequal sample sizes between the STEM and non-STEM groups as well as between the female and male managers as a result of the different sizes of the groups in the population. Such differences can affect the statistical power. We applied a post hoc analysis of the statistical power and verified our analyses with different statistical methods (i.e., multiple linear regression, ordered probit regression based on the mean, ANCOVA) in the style of a multiverse analysis (Steegen et al., 2016) to determine whether the results converged.

Models to test hypotheses
To test H1, we ran a basic Model 1 with STEM versus non-STEM as the independent variable and traditional gender role attitudes as the dependent variable, controlling for the variable age. To test H2, we added gender as a second independent variable to the first model to create Model 2. To test H3, we ran Model 3, which was the same as Model 1, but it was tested on an adjusted sample consisting of male managers only. To test H4, we ran Model 4, which was the same as Model 1, but it was tested on an adjusted sample consisting of female managers only. We also ran unstandardised versions of each model, without the covariate and unweighted. The full results of our multiverse analysis (Steegen et al., 2016) as well as an overall moderation analysis are reported in the Electronic Supplementary Materials ESM 4.

Additional exploratory analyses
We noted that, particularly in the female STEM manager group (n = 50), the sample was quite small, and thus, there may have been power issues (see the detailed power analysis in Appendix C). To increase the power and to also test for another potential moderator, we decided to expand the sample to include employees without management status and to use management status as an additional binary moderator. We ran Models 2, 3, and 4 again with management status.

RESULTS

Table 1 presents descriptive statistics and weighted zero-order correlations[3] for all variables.

Tests of the preregistered hypotheses H1-H4

To test whether traditional gender role attitudes were more pronounced in STEM than non-STEM managers (H1), we ran Model 1. In line with our hypothesis, there was a small, significant, positive relationship between STEM and traditional gender role attitudes when the covariate age was excluded ($\beta = 0.005$, $p < .001$)[4]. However, when we included the covariate age, this tendency was reversed ($\beta = -0.004$, $p < .001$), indicating that traditional gender role attitudes were less pronounced in STEM managers. The multiverse analysis[5] showed that the relationship between STEM and traditional gender role attitudes was negative in only two analyses, positive in 22 out of 24 analyses, and significant in only 8 out of 28 analyses. The effect in the multiple linear regression[6] was very small ($f^2 < 0.001$), and thus, required further investigation. In this analysis, when the covariate age was included, it was significant ($\beta = 0.09$, $p < .001$) with an effect size of $f^2 = 0.006$ in the multiple linear regression. An additional analysis showed

that STEM and traditional gender role attitudes were significantly related (β = -0.05, $p < .001$) in Model 2 when we added the variable gender; however, the direction was contrary to the hypothesis with a small effect of $f^2 = 0.001$ in the multiple linear regression, indicating that traditional gender role attitudes were less pronounced in STEM managers than in non-STEM managers. The multiverse analysis showed that this relationship was significant in 14 out of 28 analyses; therefore, when put together with the small effects, it needed to be considered a preliminary tendency. The covariate age was significant (β = 0.09, $p < .001$) with an effect of $f^2 = 0.005$ in the multiple linear regression, but it did not change the general direction of the model.

Table 1

Weighted means, standard deviations, and zero-order correlations in the total sample including non-managerial employees

Variable	*M*	*SD*	1	2	3	4
1. Attitudes	3.45	1.43				
2. STEM	0.10		-.02*			
3. Gender	0.47		-.15**	-.18**		
4. Age	46.11	12.05	.04**	-.02*	.03**	
5. Manager	0.29		-.01	.04**	-.14**	.02

Note. M and *SD* stand for mean and standard deviation, respectively. For dichotomous variables, *M* indicates the relative frequency. Age (in years) is a continuous variable. Gender role attitudes are ordinally scaled (Likert scale, ranging from 1 to 7, with higher values indicating more traditional attitudes). Dichotomous variables are STEM (non-STEM = 0, STEM = 1), gender (male = 0, female = 1), and management status (non-manager = 0, manager = 1). N = 10,101. *$p < .05$. **$p < .01$.

To investigate the relationship between gender and traditional gender role attitudes (H2), we ran Model 2, in which we added the variable gender to Model 1. As hypothesised, in male managers, traditional gender role attitudes were more pronounced than in female managers (β = -0.24, $p < .001$) with a small to medium effect size of $f^2 = 0.06$ in the multiple linear regression. The multiverse analysis showed that this relationship was significant at the .01 level across the 28 analyses.

To test whether traditional gender role attitudes were less pronounced in male non-STEM managers than in male STEM managers (H3), we ran Model 3. There was a significant relationship between STEM and traditional gender role attitudes (β = -0.03, $p < .001$) in 8 out of 28 analyses; however, it was contrary to the expected direction and indicated that gender role attitudes in STEM were less traditional than in non-STEM fields. The covariate age was significant again (β = 0.13, $p < .001$) with a small effect of $f^2 = 0.01$ in the multiple linear regression.

To investigate whether traditional gender role attitudes differ between women who are managers in STEM compared to other fields, we ran Model 4. Traditional gender role attitudes were less pronounced in female STEM managers than in female non-STEM managers (β = -0.15, $p < .001$) and significant in 24 out of 28 analyses in the multiverse analysis. There was a small effect size of $f^2 = 0.005$ in the multiple linear regression. The covariate age was significant in 4 out of 14 analyses (β = 0.02, $p < .001$) with a very small effect size of $f^2 < .001$ in the multiple linear regression, indicating that age differences were not meaningful.

Exploratory analyses

In the expanded sample, we added the binary variable management status. We again ran Models 2 to 4. Table 2 shows the means of the resulting groups, indicating that women had less traditional gender role attitudes than men and that STEM respondents had less traditional gender role attitudes than non-STEM respondents. The difference between the lowest female group mean of 2.48 and the highest female group mean of 3.34 was 0.86. By contrast, the male means differed by only 0.21, which was only ¼ of the difference in women.

Table 2

Weighted means and standard deviations in traditional gender role attitudes per group

Gender	Management status	STEM vs. non-STEM	*M* attitudes	*SD* attitudes
Female	Manager	STEM	2.48	1.15
Female	Non-manager	STEM	2.68	1.32
Female	Manager	Non-STEM	2.99	1.46
Female	Non-manager	Non-STEM	3.34	1.42
Male	Non-manager	STEM	3.5	1.36
Male	Manager	STEM	3.63	1.37
Male	Non-manager	Non-STEM	3.65	1.37
Male	Manager	Non-STEM	3.71	1.44

Note. Values were sorted from the smallest to largest mean.

We ran a model with STEM vs. non-STEM, gender, and management status as independent variables and age as a covariate. It showed that, in women, traditional gender role attitudes were less pronounced (β = -0.16, $p < .001$ with an effect of $f^2 = 0.03$ in the multiple linear regression; significant in all 28 analyses in the multiverse analysis). In STEM fields, traditional gender role attitudes were less pronounced (β = -0.05, $p < .001$ with a smaller effect of $f^2 = 0.002$ in the multiple linear regression; significant in 24 out of 28 analyses). In managers, traditional gender role attitudes were less pronounced (β = -0.05, $p < .001$ with an effect of $f^2 = 0.001$ in a multiple linear regression; significant in all 28 analyses). The covariate age (β = 0.06, $p < .001$) was significant in 11 out of 14 analyses with an effect of $f^2 = 0.002$ in the multiple linear regression.

When running the same model in the men-only sample, management status was significant in only 7 out of 28 analyses (β = -0.01, $p < .001$); however, in four analyses, being a manager was related to less traditional gender role attitudes, and in 20 analyses, being a manager was related to more traditional gender role attitudes. The effect was very small ($f^2 < 0.001$ in the multiple linear regression), and thus, there was no meaningful discrepancy between male managers and non-managers. The covariate age was significant (β = 0.09, $p < .001$) in all 14 analyses (with an effect of $f^2 = 0.006$ in the multiple linear regression). STEM (β = -0.03, $p < .001$) was significant in all 28 analyses (with an effect of $f^2 = 0.001$ in the multiple linear regression), indicating that traditional gender role attitudes were less pronounced in STEM fields.

When running the analysis in the women-only sample, management status was more strongly linked to traditional gender role attitudes (β = -0.12, $p < .001$) and significant in all 28 analyses, meaning that, in managers, traditional gender role attitudes were less pronounced (with a small effect of $f^2 = 0.01$ in the multiple linear regression). STEM (β = -0.12, $p < .001$) was significant in all 28 analyses (with an effect of $f^2 = 0.008$ in the multiple linear regression). Age was positively related to traditional gender role attitudes in 8 out of the 14 analyses and negatively related in 4 out of the 14 analyses, but the effect was significant in only 4 out of the 14 analyses (β = 0.02, $p < .001$). The effect of age was very small ($f^2 < 0.001$ in the multiple linear regression), and when considered along with the diverging directions, there was no meaningful relationship.

DISCUSSION

The present study used a large sample that was representative of the German population. To explain differences in gender role attitudes, we considered occupational field (STEM vs. non-STEM), gender, age, and management status. In this large sample, we were able to detect even small effects and trends. As we used a multiverse analysis (Steegen et al., 2016), we were able to balance the advantages and disadvantages of different methods. Overall, we found support for the hypothesis that men hold more traditional gender role attitudes than women do. Surprisingly, we found that gender role attitudes were more modern in STEM fields than in non-STEM fields. In addition, we found that for men, age was related to traditional gender role attitudes (the older, the more traditional), whereas for women, no such association was found. For women, being a manager was negatively related to traditional gender role attitudes.

Consistent with our expectations and in line with previous research (e.g., Brewster & Padavic, 2000), traditional gender role attitudes were stronger among male managers than among female managers. The effect was stronger in the management sample than in the sample that included non-managerial employees, too. More traditional gender role attitudes may lead managers in particular to not be supportive of gender equality and diversity in the workplace. Given the undisputed role of support through mentoring and sponsorship not only for women's careers (Helms et al., 2016), such attitudes might have a negative impact not only on female employees, but also on others and the organisation.

Contrary to our hypothesis, gender role attitudes were not more traditional among STEM managers than among non-STEM managers. On the contrary, there was an effect that was significant in most analyses, albeit small, suggesting that

STEM managers had less traditional gender role attitudes than non-STEM managers did. This finding is in contrast to previous research that showed that men who enter STEM occupations adhere to more conventional gender ideologies (Sassler et al., 2017). It is also in contrast to reports of women in STEM who experience more discrimination than women in non-STEM fields (Blackwell et al., 2009). However, the finding is in line with some other studies that showed that men with modern gender role attitudes are more likely than other men to end up in STEM occupations (Dicke et al., 2019) and that, at least in the field of mathematics, there is a shift away from traditional gender role attitudes (Toh & Watt, 2022). We speculate that inconsistent past findings may be due to ongoing societal changes regarding the role of women and gender role attitudes. Various kinds of data on gender role attitudes (Dicke et al., 2019; Sassler et al., 2017) are from the 1980s/90s, and the impacts of the third and fourth waves of feminism (Mohajan, 2022) may show up in later data (Bolzendahl & Myers, 2004). Moreover, the shortage of and increasing demand for employees in STEM (Farndale et al., 2021) may also have contributed to welcoming women into STEM, and positive experiences employees have had in mixed-gender teams may have reduced traditional stereotypes.

We found that older managers in general and men overall had more traditional gender role attitudes than women. The association of age and gender with traditional attitudes was in line with our expectations and previous research (Lynott & McCandless, 2000; Sweeting et al., 2014). By contrast, in women, we found no significant association between age and gender role attitudes, which was unexpected. We speculate that among women more than among men, attitudes may have changed in recent decades on the basis of personal experiences with discrimination.

Moreover, we found that traditional gender role attitudes were less pronounced among female managers in STEM fields than among female managers in non-STEM fields. This finding was in line with our hypothesis, and although we initially attributed this phenomenon to self-selection processes, our findings on less traditional gender role attitudes in STEM suggest an overall trend beyond gender distinctions. We discuss this issue further in the following section.

We expanded the sample to include non-managers and distinguished employees on the basis of whether or not they had management status. We found that traditional gender role attitudes were less pronounced in the female workforce, managers, the STEM workforce, and the younger workforce compared with others. In the male sample, we observed that those who were older and not employed in STEM fields displayed more traditional gender role attitudes. Conversely, when we examined only the women, we found that those who did not hold a managerial position and were not employed in STEM fields displayed more traditional gender role attitudes than others, and there was no significant effect of age. These results suggest that whereas age is a factor in determining traditional gender role attitudes among men, it is management status that plays an important role in determining these attitudes among women—underscoring the idea mentioned earlier that attitudes among men may have changed in recent decades and over generations. Moreover, the effect of working in a STEM field was stronger in the female sample than in the male sample. This finding shows that for women—who are a minority in STEM—working in the male-

dominated work environment of STEM is more influential than it is for the majority group of men.

We think that this asymmetry of the effect of working in a STEM field may be due to the following processes. For women, two processes may play a role: First, as argued in the theory section, selection may be relevant, not only for career entry as found in previous research (Dicke et al., 2019), but also for the chance to advance to leadership positions. Women with modern gender role attitudes may be more likely to seek leadership positions in STEM, and thus, break with traditional role models, whereas women with more traditional gender role attitudes may leave STEM fields or abandon their careers before being promoted. Second, experiencing a modern gender role as a female manager—especially in a male-dominated environment—may shape women's attitudes. They may experience being equal in the ability to complete tasks as well as in competence and may thus abandon traditional views. Neither process applies to men, a fact that may explain why men's management status was unrelated to traditional gender role attitudes.

Implications

Given previous findings that suggested that there is more discrimination against women in STEM fields than in other fields, the finding that people who work in STEM fields tend to be more likely than others to have modern attitudes toward gender roles is novel and may indicate that change has occurred. This finding means that non-STEM fields may learn from this development in STEM fields to further reduce traditionalism. In STEM fields, this finding can be used as an additional argument to encourage women to work in STEM jobs—given that many women perceive STEM as a field in which biases and prejudice are extremely prevalent (O'Connell & McKinnon, 2021). Additionally, some women's own traditional attitudes and internalized stereotypes can reduce their motivation to enter STEM fields (Starr, 2018) and may even ultimately prevent them from doing so. More research is needed to show what exactly the barriers are.

Our results show which additional variables should be considered when exploring traditional attitudes about gender: Age, gender, and management status are important factors, too. Although our findings on age and gender individually are not surprising, it is their combination that is most interesting. Older men have rather traditional attitudes regarding gender roles, but older women do not. Women, on the other hand, have less traditional attitudes toward gender roles when they are in a leadership position than when they are not. For women, further clarification is needed to show why this is the case and whether selection or socialisation (or both) are the reason(s) for this fact. With men, one might think that time has changed traditionalism. Although it seems reasonable that the effect is due to a cohort effect, we cannot test this hypothesis with cross-sectional data. For the time being, it is important to diversify boards and decision makers to counterbalance such effects—in both STEM and non-STEM fields.

Limitations and future research

First, the effects we found were small. However, their small size does not mean that they are meaningless. Small effects are worth taking seriously (Funder & Ozer, 2019), and they may be important; for example, the effect of chemotherapy on breast cancer survival is only $r = .03$ (Meyer et al., 2001), but the effectiveness matters for survivors. In particular, effects that are novel, such

as the effect that workers who are not in STEM fields have more traditional attitudes than STEM workers, are worth attending to and investigating further. Even if the effects were small, the robustness of our results was supported by the fact that the sample was large and diverse. Furthermore, a multiverse analysis supported the evidence: The (small) effects were consistently found in various analyses. When this was not the case, we reported the fact transparently, thus supporting the credibility of the results (Steegen et al., 2016).

Second, the SOEP data are panel data and data collection was beyond our control. The data were collected via face-to-face interviews (Goebel et al., 2019). The use of interviews may have led to social desirability effects that could have obscured the size of the effects, as people with strong traditional gender role attitudes may have downplayed the strength of their attitudes. We therefore recommend that data on topics related to stereotypes be collected anonymously in future studies.

Third, we found differences in our analyses, for example, between managers and non-managers and between age groups. However, because we used a cross-sectional analysis, we could not fully disentangle effects of age, period, and cohort. There are longitudinal studies on gender role attitudes and STEM career decisions (Dicke et al., 2019; Sassler et al., 2017), but these studies surveyed gender role attitudes 30 to 40 years ago and focussed on career development in the years that followed. Thus, they cannot provide insights into contemporary associations. There is a need for future research on changes in traditional gender role attitudes and, more broadly, stereotypes in a longitudinal research design with several age cohorts.

Fourth, STEM and non-STEM are broad categories. It may be interesting to further look at different sub-disciplines, as we know that gender differences vary in size depending the sub-discipline of STEM (Su et al., 2009).

CONCLUSION

Our results partially confirmed known associations: Men have more traditional gender role attitudes than women do. In part, our results were surprising: The STEM workforce is more modern than previously thought, and women in management positions are more modern than women who do not hold such a position. This difference could be an effect of selection or socialisation (i.e., exposure to non-traditional attitudes in a non-traditional role). Longitudinal research is necessary for more clarification.

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ENDNOTES

[1] Stereotypes are "qualities perceived to be associated with particular groups or categories of people" (Schneider, 2004, p. 24), e.g., "Women are bad in math." An attitude is "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly & Chaiken, 1993, p. 1), e.g., a tendency to evaluate the role description "It is best for the husband and wife to work equally so that they can share family and household responsibilities equally" either favourably or not. Even though gender stereotypes and gender role attitudes are two different constructs, they are correlated (Eagly & Madlinic, 1989).

[2] In this case and often in Germany in general, numbers for "MINT" instead of STEM are reported. MINT stands for Mathematik, Informatik, Naturwissenschaften, Technik—meaning mathematics, computer science, natural sciences, technology. Even though the terms are often similarly used, the definitions vary slightly.

[3] We report Pearson correlations, means, and standard deviations, knowing that ordinal data require different methods. As means are more insightful than medians, we report means and their corresponding standard deviations. We additionally calculated Kendall's tau, and the results were almost identical to the results for the Pearson correlations. We report Pearson correlations because they are more common.

[4] In the following, unless we indicate differently, we report standardised, weighted results that include age as a covariate.

[5] Our multiverse analysis consisted of all standardised versus unstandardised results, weighted versus unweighted, including and excluding the covariate age, and all four models (ordered probit regression based on the median, based on the mean, multiple linear regression, and ANOVA). ANOVA was only run with unstandardised values, resulting in 2*2*2*4-4 = 28 analyses. For 24 analyses, we could report positive or negative directions; directions could not be provided for the ANOVA. As we ran every analysis once with and once without the covariate, we had 14 analyses including the covariate age (for 12, we could report positive or negative directions).

[6] Ordered probit regression does not allow any effect sizes to be computed. Thus, effect sizes from the multiple linear regression (partial f^2) are reported in the text. Additionally, we computed the effect size for ANOVA (η^2), which is reported as part of our multiverse analysis tables (see the Electronic Supplementary Materials ESM 4).

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APPENDIX

Appendix A

Overview of variables, items, and response format in the SOEP data sets

Dataset	Item	Variable	Item wording	Response format
Core 2018	bip_53	Job change	**Have you changed jobs or started a new one since December 31, 2016?** This includes starting working again after a break!	Yes/No
Core 2017	bhp_63	Supervisory position	**In your position at work, do you supervise others?** **In other words, do people work under your direction?**	Yes/No
Core 2017	bhp_64	Number of people directed	**How many people work under your direction?**	Total number
Core 2018	bip_197	Gender role attitudes	**I will read you a series of statements.** **To what degree do you personally agree with each statement?** Please answer according to the following scale: 1 means disagree completely, and 7 means agree completely. a) Children below the age of 6 suffer if their mother works b) Children below the age of 3 suffer if their mother works c) It's best if the man and the woman work the same amount so they can share the responsibility for taking care of the family and household equally. *Note.* The question had included five statements that are not used in the present study, because they do not focus on gender	7-point Likert scale

			but on other traditional attitudes, e.g., "A person who is living with their partner for a long time should get married".	
Core 2018	bipbirthy	Age	**Year of birth of respondent**	4-digit year
Core 2018	bipbirthm	Age	**Month of birth of respondent**	1 to 12
Core 2018	bipmonin	Age	**Month of interview**	1 to 12
Core 2018	biptagin	Age	**Day of interview**	1 to 31
Core 2018	sex	Gender	**Sex of respondent** *Note.* Sex of respondent was assessed dichotomously in the SOEP.	Male (0), Female (1)
Core 2018	pgisco08	ISCO-08 Job code	**Current occupation**	Code

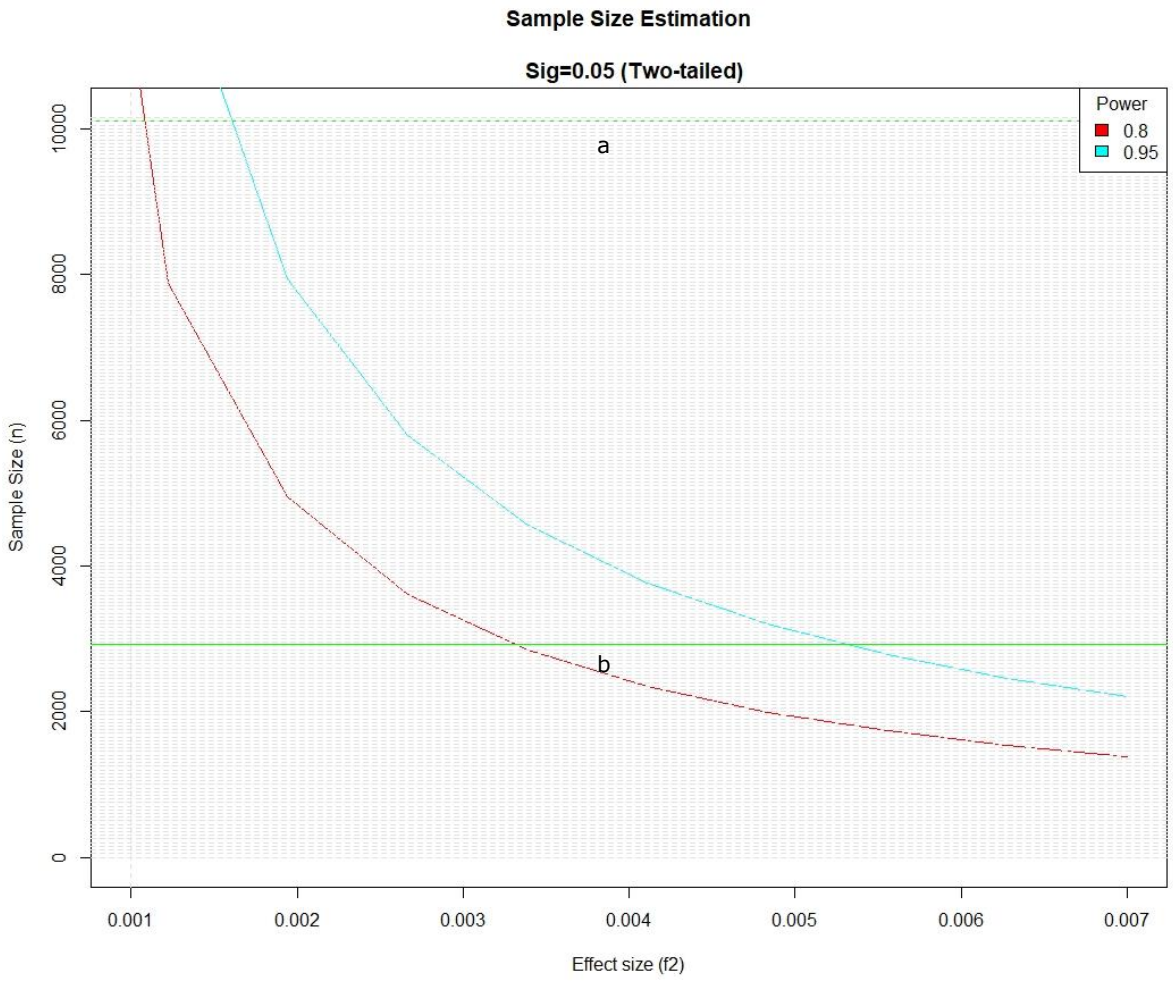
Appendix B

Overview of sample

Gender	Management status	STEM vs. non-STEM	Group size (*N*)	Percentage of total sample
Male	Non-manager	Non-STEM	2,616	25.9%
Male	Non-manager	STEM	467	4.6%
Male	Manager	Non-STEM	1,517	15.0%
Male	Manager	STEM	309	3.1%
Female	Non-manager	Non-STEM	3,924	38.8%
Female	Non-manager	STEM	177	1.8%
Female	Manager	Non-STEM	1,041	10.3%
Female	Manager	STEM	50	0.5%
Total	Total	Total	10,101	100%

Appendix C

Power analysis



Note. This figure shows power (red and blue lines) relative to the effect size and sample size. The green lines indicate the sample. [a] The line indicates the full sample of *N* = 10,101, including non-managers. [b] The line indicates the manager-only sample of *N* = 2,917.

5

CHAPTER 5: **GENERAL DISCUSSION**

5.1 Overall Summary and Integration of Results

This dissertation explores aspects of narcissism within different professional contexts, i.e., (non)managerial positions and (non)STEM fields, as well as different personal situations, i.e., (not) having a daughter, in relation to gender role attitudes and advice taking. I followed the recommendations and practices of the open science movement for transparent and replicable science, e.g., through robustness checks (Nosek et al., 2022) such as via a multiverse analysis in Manuscript 3. Additionally, I conducted a meta-analysis in Manuscript 1 (Shrout & Rodgers, 2018), preregistered all three projects with analysis code, disclosed data collection and analysis methods before analysis, and published supplementary materials including final code (Simmons et al., 2011). Manuscript 2 was published as a Registered Report, i.e., full theory and method part was peer-reviewed before conduction of analyses and was not altered after analyses.

Narcissism and advice taking were marginally, but stably, negatively correlated in the meta-analysis, with no moderating effects (Stöcker & Schütz, 2024). Differentiating narcissism into its agentic factor of narcissistic admiration and its antagonistic factor of narcissistic rivalry, we found that admiration was related to less traditional, and rivalry to more traditional, gender role attitudes in managers (Stöcker et al., 2024). The latter relation was weaker among managers with at least one daughter (Stöcker et al., 2024). In the professional context of STEM fields, attitudes were less traditional than in non-STEM fields (Stöcker & Schütz, 2023). Women showed less traditional gender role attitudes than men, and we found that the older men were, the more traditional their attitudes were (Stöcker & Schütz, 2023). For women, being a manager was associated with less traditional gender role attitudes (Stöcker & Schütz, 2023).

Overall, we found that a breakdown of narcissism into its underlying factors can lead to diverging outcomes. Personal circumstances, such as having a daughter, may be moderating factors. Between different professional contexts, such as (non-)managerial positions or (non-)STEM fields, gender role attitudes vary.

5.2 Theoretical and Methodological Implications

My dissertation contributes to research and fills research gaps in three different areas:

First, by synthesizing published and unpublished (sometimes conflicting) research in a meta-analysis on narcissism and advice taking (Stöcker & Schütz, 2024), we expand the literature on personality factors in decision-making research in a robust manner according to the standards of open science. Further, we filled a gap in meta-research between the existing meta-analysis on measurement of advice taking (Bailey et al., 2022) and the literature review on advice taking (Bonaccio & Dalal, 2006).

Second, we demonstrated the importance of treating narcissism as a multidimensional construct. The dimensions of narcissistic rivalry and admiration exhibited divergent associations with gender role attitudes (Stöcker et al., 2024). This finding is in line with other research based on the NARC that has shown differential relationships between narcissistic admiration and rivalry and outcomes, e.g., the positive relationship between admiration and short-term romantic success compared to the long-term relationship problems associated with rivalry (Wurst et al., 2017). Thus, my finding underscores the importance of differentiating between dimensions of narcissism to prevent the averaging out of effects.

Third, personal situations such as (not) having a daughter, or professional contexts such as the occupational field, play an important role in the exploration of personality factors and attitudes. I have considered situational and contextual factors in different roles in my models, e.g., having a daughter both as an independent variable and as a moderator variable (Stöcker et al., 2024), and the occupational field (STEM vs. non-STEM) and management status as independent variables (Stöcker & Schütz, 2023). We found that these personal situations make a difference, and thus, personality research also needs to consider personal and occupational contexts rather than researching in the vacuum of theoretical constructs, which would also enable transferability to practice.

5.3 Practical Implications

First, these findings reinforce the warnings against narcissists in leadership positions: Though advice may or may not be helpful, the personality of the leader should not be the reason that it is disregarded. In other words, the robust finding that narcissists take less advice (Stöcker & Schütz, 2024) underscores the fact that narcissism can be problematic in leaders, not only because of interpersonal problems, but also because of problems in decision making. In addition, narcissistic rivalry among managers in particular was related to traditional attitudes about gender roles (Stöcker et al., 2024). Thus, managers with pronounced narcissistic rivalry who are involved in the selection and promotion of their employees have particularly traditional attitudes toward gender roles and may be an additional barrier to women's career advancement.

Second, in specifying the negative implications of narcissistic leadership, narcissistic rivalry was found to be related to more traditional gender role attitudes, whereas narcissistic admiration was related to less traditional gender role attitudes (Stöcker et al., 2024). Thus, this dissertation highlights the idea that there is a bright and adaptive dimension of narcissism, admiration, and a maladaptive dimension, rivalry (Gauglitz et al., 2023). The divergence of the effects of the different subdimensions of narcissism should be taken into account when assessing personality, especially narcissism, in personnel selection.

Third, traditional gender role attitudes have been examined as potential barriers to women's careers, not only in relation to narcissism, but also in relation to different professional contexts. People in STEM fields held less traditional gender role attitudes (Stöcker & Schütz, 2023), which is contrary to general public opinion and may help in making STEM fields attractive to more women. Interestingly, men had more traditional attitudes toward gender roles with increasing age. For women, age did not play a role – but they had less traditional attitudes toward gender roles when they held managerial positions (Stöcker & Schütz, 2023). This suggests a rather complex conglomerate of age, gender, and management status that, in combination, produce more traditional or less traditional gender role attitudes. Thus, the idea that gender role attitudes will be more modern in a couple of years just because time goes by is overly simplifying.

5.4 Limitations and Future Research

First, strong and coherent theoretical concepts are the basis for fruitful research (Burghardt & Bodansky, 2021). However, not all research is based on a strong theoretical foundation, such as research on the daughter effect. Even though there are many studies that report a daughter effect (e.g., Greenlee et al., 2020; Warner, 1991), there is no strong and coherent theoretical foundation, and empirically, some studies have also found null effects (e.g., Leder & Niszczota, 2022). The study included in this dissertation may help to better understand the daughter effect in order to provide a basis for elaborating the theory behind it. Future research could clarify questions such as: Is there a daughter effect if you only have one daughter, or only if your first child is a daughter, or does the effect become stronger with more daughters? Does it only apply to fathers? What is the explanation for this?

Second, research findings can only be as good as the measurement methods used and the data collection process on which the research is based. Manuscript 2 used short measures that may not capture the whole picture of narcissism. However, there is always a trade-off between the efficiency and the accuracy of a measurement (e.g., Kemper et al., 2019), and in the case of this manuscript, there was a trade-off between measurement length and the collection of a large and (for the German population) representative data set. Future research should carefully consider this trade-off. In Manuscripts 2 and 3, a gender role attitude scale was used. Because gender role attitudes change over time (Cotter et al., 2011), it is questionable whether items should be continually adjusted to reflect current developments, which would limit comparability in longitudinal studies but better capture the current situation (Walter, 2018). Providing sociohistorical context (as recommended by McHugh & Frieze, 1997) and transparency of the items used (see Manuscripts 2 and 3) put the measures in perspective to avoid misunderstanding. In addition, data collection in the SOEP was conducted in face-to-face interviews. Since narcissism measures are known to be relatively free of social desirability (Auerbach, 1984; Watson et al., 1984), the problem arises only on the side of

measuring gender role attitudes. Social desirability can obscure true results and effect sizes. In this dissertation, panel data were used for Manuscripts 2 and 3 to build on a large and representative data set on a difficult-to-access group of participants (i.e., managers), however, the measurement variables and data collection process were designed externally. Future research should choose the best approach for the specific research questions and weigh different options. Meta-research can then find overarching results.

Third, panel data were used, which have several advantages described earlier. In addition, large datasets help find small effects that are nonetheless meaningful, such as in Manuscript 3, when they contradict general public opinion (Stöcker & Schütz, 2023). However, because of the cross-sectional use of the data, the effects of age, period, and cohort cannot be disentangled (Glenn, 2005). Longitudinal research may fill this gap in the future.

Fourth, we found that context matters (see 5.2 Theoretical and Methodological Implications). However, context is not always considered in research. In the meta-analysis, several contextual factors are of interest that could not be considered as moderating effects because the primary studies had not previously examined these contextual factors, for example: What is at stake for those taking advice: their own money, career, or reputation, or nothing at all (as in many laboratory settings); is it a private or public setting with greater visibility; is it a competitive situation? As a recommendation for future research, more consideration should be given to contextual factors, especially when the definition of a concept implies that there may be differences depending on the context. For example, narcissistic admiration and rivalry are defined in terms of other people, i.e., one is admired by other people and rivalry necessarily takes place among at least two persons. This naturally leads to more accurate and detailed research: when the associations between personality factors and outcomes are examined in different contexts and situations, the research becomes more complex and detailed, but it is also an opportunity to increase fairly small effect sizes by using variables as moderators that would otherwise obscure the true associations.

Fifth, we noted that the multidimensionality of narcissism matters. However, in research, a unidimensional narcissism score is often given (e.g., O'Reilly & Hall, 2021). This could obscure possible underlying divergent effects between dimensions. As a second consequence, meta-research – like Manuscript 1 of my dissertation – cannot substantiate such effects. Based on the concept of Miller et al. (2021) (see Figure 1.1), we recommend the use of multidimensional concepts and scales. In addition, current research, e.g., on narcissism and advice taking, uses mostly measures of grandiose narcissism (see the left branch of Figure 1.1), i.e., there is little research addressing vulnerable or even pathological narcissism (Gauglitz, 2022), which highlights areas for future research.

5.5 Conclusion

The current dissertation examines narcissism in its multidimensionality and its relation to gender role attitudes and advice taking. Additionally, different professional contexts, i.e., managerial or non-managerial positions, and personal situations, i.e. (not) having a daughter, were considered to further explain and detail these associations. Gender role attitudes were examined in different occupational fields (STEM vs. non-STEM). Theoretical implications, e.g., the consideration of the multidimensionality of narcissism, practical implications, e.g., the consequences of having narcissists in leadership positions, as well as limitations and starting points for future research have been discussed.

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