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## Students' career exploration

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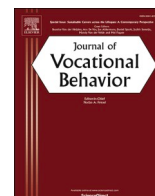
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## Journal of Vocational Behavior

journal homepage: [www.elsevier.com/locate/jvb](http://www.elsevier.com/locate/jvb)Students' career exploration: A meta-analysis<sup>☆</sup>Anne-Kathrin Kleine<sup>\*</sup>, Antje Schmitt, Barbara Wisse

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## ABSTRACT

Career exploration refers to the exploration of the environment and the self with the aim of gathering career-related information. On the basis of Lent and Brown's (2013) model of career self-management (CSM), the current meta-analysis examined the antecedents and outcomes of career exploration among college students ( $K = 109$ ,  $N = 34,969$  students). We found support for the applicability of the CSM model to the context of students' career exploration. Specifically, positive associations were found for the association of the three core person-cognitive variables self-efficacy for career exploration and decision-making ( $r_c = 0.52$ ), outcome expectations ( $r_c = 0.31$ ), and career-exploratory goals ( $r_c = 0.42$ ) with career exploration. Results of path analyses suggest that the effects of both self-efficacy and outcome expectations on career exploration are mediated by career-exploratory goals. Further, in line with the CSM model, career exploration was positively related to career-related support ( $r_c = 0.33$ ) and negatively related to barriers ( $r_c = -0.15$ ). Moreover, career exploration was associated with important career-related outcomes, such as career decidedness ( $r_c = 0.22$ ), and perceived employability ( $r_c = 0.35$ ). Exploratory moderator analyses revealed that some relationships are influenced by sample (i.e., age, gender, cultural background) and measurement (e.g., publication date) characteristics. The findings of this meta-analysis highlight several implications for the further development of the CSM model, future research on students' career exploration, and career development practice.

## 1. Students' career exploration: a meta-analysis

The college years are a significant time in young adults' lives during which they set career-related goals and explore potential career paths. However, choosing a career path and establishing a career-related identity can be a challenging endeavor. For example, the number of career-related options makes it challenging to commit to one. Moreover, some students may not feel prepared to make career choices as they lack the necessary information about professions and employers (e.g., Gati et al., 1996). To facilitate the choice process, students may engage in career exploration by actively acquiring and accessing career-related information (Stumpf et al., 1983). In this sense, career exploration represents self-regulatory behavior that may help students choose a career path and reach their career goals (Lent & Brown, 2013). Career exploration is centrally embedded in the social-cognitive model of career self-management

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(CSM, Lent & Brown, 2013, p. 564) and in the field of career development research more broadly (e.g., Blustein, 1997; Lent et al., 1994; Super et al., 1981). Students may use two sources to explore their career options — the environment and the self (Blustein, 1997; Jordaan, 1963; Stumpf et al., 1983). Gathering information on career opportunities (i.e., environment exploration) and reflecting on how their (past) behavior integrates with their future career (i.e., self-exploration), raises students' awareness of their career options and how their interests, values, and behaviors integrate with the world of work (Jiang et al., 2019).

The CSM model explains how cognitive-person variables (i.e., career-related self-efficacy, outcome expectations, career-exploratory goals), personality traits (e.g., conscientiousness), and contextual support factors (e.g., career support provided by family members) and barriers (e.g., financial constraints) are related to each other and jointly influence career exploration (Lent et al., 2016; Lent & Brown, 2013). In addition, Lent and Brown (2013) argue that career exploration as goal-directed behavior predicts career-related outcomes, such as students' career decidedness, decisional distress, and career success factors.

Since the development of a comprehensive measurement of career exploration (the Career Exploration Survey, CES, Stumpf et al., 1983), the investigation of the processes predicting and the outcomes resulting from career exploration has received considerable research attention (for a review, see Jiang et al., 2019). Despite the accumulation of research on career exploration over the past decades, and although career exploration plays a crucial role in students' career preparation, the field still lacks a comprehensive overview and empirical integration of research findings on the antecedents and outcomes of students' career exploration. The current meta-analysis aims to provide an overview and empirical integration of previous research findings on students' career exploration based on the CSM model.

With the current meta-analysis, we contribute to career development research and practice in three critical ways. First, we combine a systematic review with meta-analytic techniques to test the applicability of the CSM model to the context of students' career exploration. Specifically, we aggregate research findings on relationships of career exploration with antecedent and outcome variables proposed by the CSM model. In the same vein, we examine the interrelatedness of the three cognitive-person factors and their joint contribution in explaining students' career exploration. To this end, we apply meta-analytic structural equation modeling to test whether career-exploratory goals mediate the effects of self-efficacy and outcome expectations on career exploration as proposed in the CSM model (see Lent & Brown, 2013). In addition, we use multivariate regression analysis to assess the unique contribution of the three person-cognitive variables in predicting career exploration. Fig. 1 presents our meta-analytic model, based on an adaptation of the CSM model to the context of students' career exploration. In the model, we added all pathways considered in Lent and Brown (2013) seminal article and highlighted those investigated in our meta-analysis.

Second, we expand the CSM model by examining how environment and self-exploration are interrelated and how career-related variables are differently associated with overall career exploration and its two dimensions. Lent and Brown (2013) did not make any predictions about how relationships could be different for each of the two dimensions of career exploration. However, environment exploration as the behavioral and self-exploration as the cognitive component of career exploration are different processes (Stumpf et al., 1983), and different antecedent conditions have been found to foster environment and self-exploration, respectively (e.

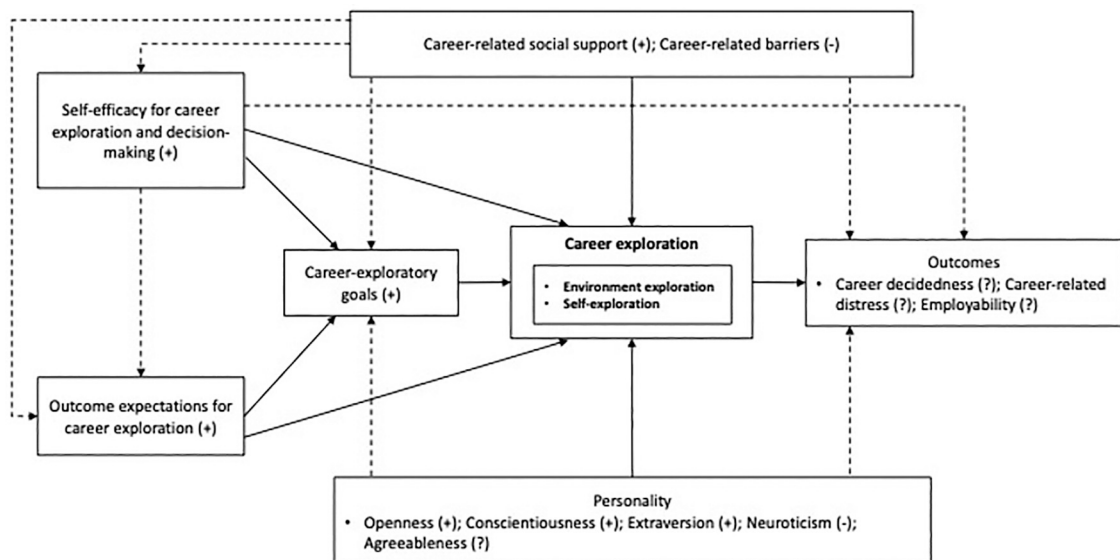


Fig. 1. Meta-analytic model.

Note: Adapted from Lent, R. W., & Brown, S. D. (2013), Social cognitive model of career self-management: Toward a unifying view of adaptive career behavior across the life span. *Journal of Counseling Psychology*, 60 (4), 557–568. doi:<https://doi.org/10.1037/a0033446>. The solid lines and signs in brackets refer to hypotheses or research questions examined in the current meta-analysis. (+) indicates an expected positive relationship; (-) indicates an expected negative relationship; (?) indicates a research question. The dashed lines refer paths included in the model of career self-management (Lent & Brown, 2013) that were not examined in the current meta-analysis.

g., [Ketterson & Blustein, 1997](#)). By providing insights into the associations between career-related variables and the two dimensions of career exploration separately, we seek to fine-tune the CSM model's predictions regarding the antecedents and outcomes of environment and self-exploration as the two distinct dimensions of career exploration.

Finally, the findings of our meta-analysis may have important practical implications. Career counselors may use the knowledge on antecedents and outcomes of students' career exploration gained through our meta-analysis to develop evidence-based career interventions that effectively support students in reaching their career goals.

## 2. Conceptualization and operationalization of career exploration

Career exploration refers to thoughts and behaviors "directed toward enhancing knowledge of the self and the external environment, that an individual engages in to foster progress in career development" ([Blustein, 1992, p. 175](#); see also [Jordaan, 1963](#); [Super, 1963](#)). The environment exploration dimension refers to the exploration of environmental resources and obtaining information about potential occupations. For instance, students may engage in environment exploration by investigating career possibilities, obtaining information on specific jobs or companies, and seeking information on specific areas of career interest. Self-exploration aims at integrating one's values, goals, and past behavior with potential occupational paths and involves reflecting on how one's past integrates with one's future career, being retrospective in thinking about one's career, and understanding the relevance of past behavior for one's future career ([Stumpf et al., 1983, p. 220](#)). Importantly, to explore their careers, students must engage in both the exploration of the environment and the self (e.g., [Blustein, 1997](#); [Jordaan, 1963](#)). Both environment and self-exploration are commonly assessed retrospectively, in terms of behavior and cognition people have engaged in over the past months ([Stumpf et al., 1983](#)).

With the development of the Career Exploration Survey (CES), [Stumpf et al. \(1983\)](#) provided the first validated instrument targeted toward measuring career exploration. Over the past decades, modified versions of the CES have been developed and used in student samples. For example, some authors added items to the original scales to assess a wider array of self-exploratory activities that characterize the vocational behavior of students (e.g., [Blustein, 1988](#); [Blustein et al., 1989](#); [Nasta, 2007](#)). Moreover, career exploration has been assessed in terms of in-depth (i.e., specific) and in-breadth (i.e., diversive) career exploration of the Vocational Identity Status Assessment (VISA, [Porfeli et al., 2011](#)), and with alternative self-developed instruments ([Hirschi, 2009](#); [Kracke, 1997](#); [Lent et al., 2014](#)).

## 3. Career exploration as part of the social-cognitive model of career self-management

The social-cognitive model of career self-management (CSM, [Lent & Brown, 2013](#)) aims at explaining the conditions that predict the use of adaptive career behaviors as behaviors individuals use to manage their career development and cope with career-related challenges. In this sense, the CSM model complements social cognitive career theory (SCCT, [Lent et al., 1994](#)), which is mainly focused on the development of career-related interests and choices. Additionally, in contrast to models that emphasize career adaptability as a set of individual attributes that promote career development and adaptation (e.g., [Rottinghaus et al., 2005](#)), the CSM model offers a wider perspective on the person and context factors that predict adaptive career behavior and cognition.

[Lent and Brown \(2013\)](#) have applied the CSM model to the context of career exploration (p. 564). Although the CSM model does not exclusively focus on students, the model has been widely applied to predict students' career exploration (e.g., [Lent et al., 2016](#); [Lent et al., 2019](#)). That is because students find themselves being expected to make career decisions during their college years and preparing to transition from university to work. By exploring the environment and the self, they may discover available career options and eventually choose a career path that fits their values and interests. Accordingly, uncovering the factors that promote or hamper students' career exploration may contribute to understanding the boundary conditions of successful preparation for entering the world of work.

According to the CSM model, career exploration is more likely if people a) possess positive beliefs about their ability to engage in behaviors necessary for making career decisions (i.e., self-efficacy for career exploration and decision making), b) expect positive outcomes to occur as a result of their career-exploratory efforts (i.e., outcome expectation for career exploration), c) set clear and specific goals to engage in career exploration (i.e., career-exploratory goals), d) have environmental supports (e.g., supportive parents), e) face minimal barriers (e.g., financial constraints), and f) possess favorable levels of certain personality characteristics (e.g., high conscientiousness, extraversion, and openness; low neuroticism). Next to focusing on direct effects, the CSM model explains how these factors are related to each other and jointly influence career exploration ([Lent & Brown, 2013](#)). Moreover, career exploration as goal-directed action makes it more likely that people will attain the career outcomes they seek ([Lent & Brown, 2013](#)).

## 4. Antecedents of career exploration

We describe predictions made by the CSM model regarding cognitive-person, personality, and contextual antecedents of career exploration. In addition to considering direct pathways, we explain how the effect of self-efficacy and outcome expectations are mediated through career-exploratory goals, in line with our conceptual model ([Fig. 1](#)).

### 4.1. Cognitive-person factors

A type of self-efficacy that is tied to the domain of career development relevant for students' career exploration is self-efficacy for career exploration and decision-making (CSE). CSE refers to individuals' perceived ability to manage tasks that are relevant during a

specific career-related process, such as the preparation for entering the workforce during the college years (Betz & Luzzo, 1996; Lent & Brown, 2013). The CSM model states that if students believe in their ability to perform actions that facilitate the decision-making process, they are more likely to engage in career exploration (Lent et al., 2016).

Self-efficacy for decision-making is commonly assessed with scales developed by Taylor and Betz (1983) and Betz et al. (1996). More recently, Lent et al. (2016) developed a brief measure of self-efficacy for career exploration and decision-making activities. In keeping with Lent et al. (2016), we combine the two forms of self-efficacy and propose:

**Hypothesis 1.** Self-efficacy for career exploration and decision-making is positively related to career exploration.<sup>1</sup>

In the context of career exploration, outcome expectations refer to the belief that career exploration will yield the desired results (Lent & Brown, 2013). According to the CSM model, students are more likely to explore their careers if they believe that career exploration will lead to the attainment of relevant goals (Lent & Brown, 2013). Outcome expectations for environment and self-exploration as well as overall outcome expectations have been shown to positively relate to environment and self-exploration in student samples (e.g., Lent et al., 2017). We propose:

**Hypothesis 2.** Outcome expectation for career exploration is positively related to career exploration.

Drawing from theories of goal-directed behavior (e.g., Ajzen & Madden, 1986), Lent and Brown (2013) propose career goals to motivate career-relevant actions. Goals are facilitative of action if they are clear, stated publicly, congruent with personal values, and refer to a specific action (Lent & Brown, 2013). Accordingly, students who possess goals to engage in career-exploratory behavior are more likely to transform these goals into career-exploratory action. Thus, we propose:

**Hypothesis 3.** Career-exploratory goals are positively related to career exploration.<sup>2</sup>

Notably, next to considering direct effects, Lent and Brown (2013) propose career-exploratory goals to mediate the relationship of self-efficacy and outcome expectations with career exploration (Lent & Brown, 2013). First, the belief to be able to perform a specific behavior successfully makes it more likely to set clear and specific goals to engage in the respective behavior (e.g., Zimmerman et al., 1992). That is, students who believe in their ability to engage in career exploration are more likely to set career-exploratory goals. Second, the belief that career exploration will yield them the desired results makes it more likely for students to set clear and specific goals to engage in career exploration (Lent & Brown, 2013). Career-exploratory goals, in turn, facilitate career-exploratory actions. In line with the CSM model, we propose:

**Hypothesis 4.** The positive relationship between self-efficacy for career exploration and decision-making and career exploration is mediated through career-exploratory goals.

**Hypothesis 5.** The positive relationship between outcome expectations for career exploration and career exploration is mediated through career-exploratory goals.

#### 4.2. Personality traits

The most established conceptualization of personality involves five components — openness, conscientiousness, extraversion, agreeableness, and neuroticism — referred to as the Big Five (e.g., Goldberg, 1990). According to the CSM model, four of the Big Five traits may influence career exploration (Lent & Brown, 2013). Specifically, openness to experience may spur students' curiosity to explore themselves and their career options and to stay unprejudiced regarding the information they obtain (Nauta, 2007). Conscientiousness may facilitate the use of career-exploratory behaviors and thoughts as it aids in planning and persisting in the face of challenges and following through with upcoming tasks (Lent & Brown, 2013; Reed et al., 2004). Career exploration involves interacting with well-known and less known people. Accordingly, the sociability associated with extraversion may support students' career exploration (Lent & Brown, 2013; Nauta, 2007). On the contrary, neuroticism enhances the likelihood of experiencing anxiety and negative arousal when dealing with challenging life situations. It may thus hinder active exploration of the environment and the self (Lent & Brown, 2013; Nauta, 2007). Agreeableness is not included as a predictor of career exploration in the CSM model. Consequently, we do not develop a hypothesis for the relationship between agreeableness and career exploration (Lent & Brown, 2013). Accordingly, we propose the following hypotheses and one research question:

**Hypothesis 6.** Openness is positively related to career exploration.

**Hypothesis 7.** Conscientiousness is positively related to career exploration.

**Hypothesis 8.** Extraversion is positively related to career exploration.

**Hypothesis 9.** Neuroticism is negatively related to career exploration.

<sup>1</sup> We initially proposed two hypotheses for the relationship of career exploration with career exploration self-efficacy and career decision-making self-efficacy (<https://osf.io/jzvhc>). However, there were not enough ( $k \geq 3$ ) studies that differentiate between career exploration self-efficacy and career decision-making self-efficacy.

<sup>2</sup> In our pre-registration, we use the term "career engagement goals" to represent career-exploratory goals. We changed the term to align with the terminology used in the CSM model.

*Research Question 1:* What is the relationship between agreeableness and career exploration?

#### 4.3. Contextual support and barriers

According to the CSM model, people are more likely to engage in career exploration when they feel supported by their social environment (Lent & Brown, 2013). This assumption is in line with Blustein's (2011) relational theory, according to which the processes related to career development and exploration may be facilitated or hindered by relational experiences, such as receiving career-related support from important others. Potential sources of social support relevant for career development include family members, peers, or professionals (e.g., instructors or student counselors Flum, 2001). Thus, we propose:

**Hypothesis 10.** Career-related social support is positively related to career exploration.

The CSM model further proposes that barriers (i.e., factors that inhibit or hinder the attainment of relevant goals, Hirschi et al., 2019) diminish the engagement in career exploration because they constrain the possibilities to become active (Lent & Brown, 2013). Swanson and Tokar (1991a) have identified three categories of career barriers relevant for career development, namely attitudinal (e.g., lack of interest), interactional (i.e., contextual, e.g., financial difficulties), and social-interpersonal (e.g., family disapproval) barriers. For example, if students perceive their financial situation as rendering the pursuit of particular career paths impossible, they may be demotivated and disengage from exploring themselves and their career options. Similarly, receiving negative feedback from their peers regarding their career development may be unsettling and lead students to withdraw from exploring potential career paths and themselves. Hence, we propose:

**Hypothesis 11.** Career-related barriers are negatively related to career exploration.

#### 4.4. Outcomes of career exploration

While outcomes of career exploration are not formally included in the CSM model (Lent & Brown, 2013, p. 564), Lent and Brown (2013) mention three outcomes of career exploration in their seminal article, namely career decidedness, decisional distress, and career success. We initially considered all three potential outcomes of career exploration (see <https://osf.io/jzvhc>). While career decidedness and decisional distress have been studied extensively (e.g., Lent et al., 2016; Lent et al., 2019), empirical research on career success as an outcome of career exploration is scarce. Our meta-analytic summary is limited to the constructs that have been studied in the literature. Consistent with best methodological practice, we included relationships in our meta-analysis that were investigated in  $k \geq 3$  independent samples (e.g., Eby et al., 2008; Rudolph et al., 2017). This criterion led to the exclusion of career success as an outcome of career exploration.

Career decidedness refers to the level of confidence or certainty about a particular career-related decision (Gordon, 1998) and is often operationalized in terms of low levels of decision-making difficulties (Osipow et al., 1976). Gaining insight into potential career paths and the self may enhance students' readiness to choose a career consistent with their values, goals, and interests (Cheung & Arnold, 2014; Holland, 1997; Super et al., 1981), thus supporting their career decidedness. Because career decidedness is not formally included in the CSM model (Lent & Brown, 2013, p. 564), we propose the following research question:

*Research Question 2:* Is career exploration positively related to career decidedness?

Decisional distress represents an anxious attitude toward or the experience of undesirable stress relative to making career choices that are essential for one's career development (Osipow et al., 1976; Stumpf et al., 1983). In contrast to decision-making difficulties, decisional distress explicitly refers to the discomfort experienced throughout the career decision process (Hacker et al., 2013). Specifically, decisional distress may refer to doubts about one's current career choice (i.e., career self-doubt, Porfeli et al., 2011), anxiety of committing to a specific career path (i.e., commitment anxiety, Hacker et al., 2013), the experience of negative emotions related to a lack of understanding of the decision-making process (i.e., decision making confusion, Sampson et al., 1998), and undesirable stress accompanying the decision-making process (decisional stress, Stumpf et al., 1983). Career exploration as self-regulatory behavior and cognition (Lent & Brown, 2013) may support students' coping with career-related distress (Praskova et al., 2015). That is, as students explore their environment and themselves, they make an active attempt to deal with the challenges of the decision-making process, which, in turn, may reduce stress and anxiety experienced relative to making career decisions (Lent et al., 2016; Lent & Brown, 2013). However, similar to career decidedness, decisional distress is not included in the CSM model (Lent & Brown, 2013, p. 564). Thus, we propose the following research question:

*Research Question 3:* Is career exploration negatively related to decisional distress?

Lent and Brown (2013) propose career exploration as an adaptive career behavior to lead to the attainment of career-related goals. Although not considered in Lent and Brown (2013) seminal article, CSM scholars have proposed career exploration to enhance individuals' perceived employability (e.g., Okay-Somerville & Scholarios, 2017). In the case of entering the world of work, employability refers to the ability to gain employment (Rothwell et al., 2008). By exploring career options and themselves, students can better identify and apply for jobs that suit them, thus likely enhancing their perceived employability (Okay-Somerville & Scholarios, 2017). Indeed, there exists some evidence for a positive relationship between both dimensions of career exploration and perceived



employability (Okay-Somerville & Scholarios, 2017). Thus, we propose the following research question:

*Research Question 4: Is career exploration positively related to perceived employability?*<sup>3</sup>

#### 4.5. Demographic covariates

Demographic variables are considered as distal antecedents of career exploration and its predictors in Lent and Brown (2013) seminal article. Still, they have not formally been included in the CSM model (Lent & Brown, 2013, p. 564). However, previous research has shown that age, gender, and socio-economic status (SES) may affect career exploration directly (e.g., Ketterson & Blustein, 1997). For example, Ketterson and Blustein (1997) found chronological age to be the strongest predictor of self-exploration in a student sample, whereas other studies found no relationship between age and career exploration or its two dimensions (e.g., Cai et al., 2015; Okay-Somerville & Scholarios, 2017). There exists no conclusive evidence for the effect of gender on students' career exploration. On the one hand, it has been argued that due to gender role models, women explore careers from a narrower set of career options, thus leading to lower levels of career exploration among female compared to male students (Farmer, 1995). On the other hand, female students may feel more motivated than male students to engage in career exploration because they are otherwise more likely to be excluded from occupational paths associated with prestige and high income (Lazarides et al., 2016). Finally, higher SES may allow students to fully concentrate on exploring their career options with the aim to decide on a career path that suits them (Blustein et al., 2000). Because the CSM model does not explicitly propose associations between demographic characteristics and career exploration, we examine these relationships as part of our exploratory analyses.

## 5. Method

### 5.1. Literature search and inclusion and exclusion criteria

In the literature search, we followed the steps recommended by Harari et al. (2020). A PRISMA diagram that maps out the number of records identified, included and excluded along with the reasons for exclusions has been added to the supplementary material (accessible via <https://osf.io/7yhbw/>).

The primary literature search was conducted between November 20th, 2020, and January 5th, 2021. First, we searched in the electronic databases Web of Science - Core Collection (platform: Clarivate), ERIC (platform: EBSCO), PsycInfo (platform: EBSCO), Academic Search Premier (platform: EBSCO), and ProQuest (including dissertations and theses; scholarly journals; conference papers and proceedings; working papers), using the keywords "career exploration" and related expressions (e.g., "vocation\* exploration"); "students" and related expressions (e.g., "college") published between 1983 and November 2020. A supplementary keyword search in Business Source Premier (platform: EBSCO) on July 2nd, 2021, for articles published between 1983 and November 2020 yielded no additional studies. Second, we conducted forward-searching in Google Scholar of studies citing relevant measurement development papers (i.e., the Career Exploration Survey, CES, Stumpf et al., 1983; career exploration measurements by Kracke (1997), Nasta (2007), and Hirschi (2009); and the Vocational Identity Status Assessment, VISA, Porfeli et al., 2011) via Google Scholar.<sup>4</sup> Third, we searched the abstracts of conference proceedings of the Academy of Management Conference (1983–2020), the Conference of the Society for Industrial and Organizational Psychology (2004–2020), and the Conference of the European Association of Work and Organizational Psychology (2013–2019) using the keyword "career exploration". After removing duplicates, these three steps yielded 5441 studies.

The outputs of the search were exported to Mendeley desktop 1.19.8 (Zaugg et al., 2011). Duplicates identified automatically in Mendeley were checked and removed by the first author. Subsequently, titles and abstracts of all articles were scanned in Mendeley, and studies were filtered based on the inclusion and exclusion criteria. In case the title or abstract scan led to uncertainty about whether or not an article should be included, the method section of the respective article was reviewed to obtain the necessary information. First, to qualify for inclusion, studies must have measured past or present engagement in environment and self-exploration as defined by Stumpf et al. (1983). We included studies that measured career exploration with the CES, as well as translated (e.g., Cai et al., 2015) and modified versions thereof (e.g., Blustein et al., 1989; Nasta, 2007). Studies published in languages other than English were translated using software. Further, in line with career exploration theory (Stumpf et al., 1983) and previous research (see Jiang et al., 2019), we included studies that used composites of environment and self-exploration and other aspects of the exploration process (e.g., Sui et al., 2019). Finally, the career exploration subscales of the Vocational Identity Status Assessment (VISA, Porfeli et al., 2011) were included, as were studies that used self-developed scales that measure aspects of both environment and self-exploration (e.g., Kracke, 1997). This led to the exclusion of studies that measured only one of the two career exploration dimensions (e.g., Hurst & Good, 2009) or that operationalized career exploration as a composite of career exploration and other constructs (e.g., Green, 2020). It further led to the exclusion of non-empirical studies (e.g., Perrone & Vickers, 2003).

Second, studies must have measured career exploration in a sample of individuals who receive tertiary education at a university or college. Third, in addition to career exploration, studies must have measured at least one antecedent or outcome variable from our conceptual model (see Fig. 1). Fourth, we excluded intervention and training studies, unless pre-intervention or control group correlations between career exploration and other variables are provided (e.g., Pinto et al., 2015). Finally, a study that used the same data

<sup>3</sup> Perceived employability as an outcome of career exploration was not included in our pre-registration.

<sup>4</sup> Backward searches in published review articles (Jiang et al., 2019; Taveira & Moreno, 2003) yielded no additional references.

set as another study was excluded unless different variables were considered.<sup>5</sup>

As a result of our title, abstract, and method section scan, we identified 1504 articles as potentially relevant. Commonly identified reasons for exclusion were that the study did not focus on career exploration ( $k = 2820$  studies) or that the sample that was used did not consist of students ( $k = 1459$  studies). We contacted 60 authors to retrieve information missing in the papers identified as relevant (e.g., correlation coefficients between career exploration and other variables). Further, we contacted 13 authors to ask for full versions of theses, data associated with conference contributions, or papers we could not retrieve online. In total, 20 authors replied to our requests, and eight authors provided missing information or sent full texts of manuscripts. Despite our efforts to obtain full texts from authors directly, if we were unable to retrieve them online, we did not receive the full texts of 42 studies, most of which were published in Korean or Chinese.

Finally, we applied multiple strategies to retrieve unpublished data. That is, we contacted 39 authors of articles that were included in our meta-analysis and requested articles using professional mailing lists (i.e., the Academy of Management Organizational Behavior and the German Psychological Society mailing lists). None of the authors contacted replied to our call for unpublished data. Applying our inclusion and exclusion criteria, a full-text screening of potentially relevant articles resulted in a data set of  $K = 103$  relevant studies ( $K = 109$  independent samples,  $N = 34,969$  students).

## 5.2. Coding of study information

The first author coded data of 71 articles. Three trained coders coded an additional set of 32 articles. All studies coded by trained coders were checked by the first author. Inconsistencies were discussed during weekly calibration meetings until agreement was reached. Additionally, in line with approaches to ensure accuracy in coding established in previous meta-analyses (e.g., Hoffman & Woehr, 2006), the first author and one trained coder recoded a random sample of 41 articles in total (39.8%). Interrater agreement was very high for both zero-order correlations and reliabilities (97.8%) and moderator categories (96.0%). Only two mistakes in zero-order correlations and reliabilities (of 316 checked; 0.6%) and three mistakes in moderator categories (of 420 checked; 0.7%) occurred in the initial round of coding.

Table 1 shows all construct names, definitions, and example scales. Of note, all variables considered in our meta-analysis were measured with self-report instruments (with one exception, Guan et al., 2015). Whenever data was reported for more than one time point, we included relationships between career exploration and other variables measured at the same time point (e.g., Lent et al., 2019). Regarding the demographic variables included in our study, we applied the following specifications: Age was coded chronologically (i.e., in years); and we used dummy variables to code gender (i.e., 0 = male, 1 = female). Parental occupation and educational attainment, own economic resources, and self-perceived socioeconomic status (SES) were considered as indicators of SES (Eshelman & Rottinghaus, 2015). For our bivariate analyses, we coded a total of 228 independent effect sizes from  $k = 109$  samples and from 103 studies. To estimate the path models, it is necessary to code primary studies for pairs of correlations among the independent and mediator variables. Therefore, we checked all studies included in the main analyses for relationships between self-efficacy for career exploration and decision-making, outcome expectations, and career-exploratory goals. This step resulted in a set of 16 effect sizes from  $k = 7$  independent samples used in our meta-analytic path analyses.

## 5.3. Meta-analytic procedures

### 5.3.1. Bivariate relationships

We meta-analyzed relationships between overall (i.e., composite) career exploration, as well as its two dimensions, environment and self-exploration, and antecedent and outcome variables outlined in our conceptual model (Fig. 1) using random-effects meta-analysis. Observed correlations were corrected for sampling error by calculating sample-weighted correlations, and for measurement error by correcting for lack of perfect reliability (Schmidt & Hunter, 2015). When reliabilities were not reported, we followed the suggestions by Wiernik and Dahlke (2020) and imputed artifacts using bootstrapping. Because we had no reason to believe that the measurement of our demographic variables age, gender, and SES were affected by measurement error, we followed previous practice (e.g., Ng & Feldman, 2008) and did not attenuate the measurement of demographic variables. We report both sample size weighted ( $r$ ) and sample size-weighted and reliability-corrected correlations ( $r_c$ ) along with its 95% confidence interval. To maintain the independence of effect size estimates, we used only one effect size for a relationship between career exploration and an antecedent/outcome variable per independent sample. We computed composite scores for studies reporting relationships between career exploration and multiple variables that belong to the same construct following Schmidt and Hunter's (2015) approach. Similarly, when studies reported relationships between the two dimensions of career exploration and other variables included in our model, we calculated composite correlations and reliability coefficients (Schmidt & Hunter, 2015). To examine heterogeneity in the obtained estimates, we computed 80% credibility intervals for  $r_c$ . A wide credibility interval indicates that meaningful moderators may be present (Wiernik et al., 2017). Finally, to provide an estimate of the amount of variance attributable to study design artifacts, we followed the suggestions of Schmidt and Hunter (2015) and report the correlation of observed effects with sampling and measurement error, i.e.,  $\text{cor}(r, \text{artifacts})$ .

To interpret the correlation estimates we followed the recommendations by Wiernik et al. (2017) for overall effect sizes in

<sup>5</sup> In one case, we were in doubt whether the data considered came from different sources. As we could not obtain this information from the authors, we included only one of the two studies.



**Table 1**  
Construct definitions and example measures.

Construct and construct subcategory	Description	Example measures
<b>Self-efficacy for career exploration and decisionmaking</b>	The perceived ability to successfully perform specific tasks relevant for making career decisions (Taylor & Betz, 1983)	Career Decision-Making Self-Efficacy Scale-Short Form (Betz et al., 1996); Career Exploration and Decision Self-Efficacy Scale (Lent et al., 2016)
<b>Outcome expectations for career exploration</b>	The perceived probability that exploring the environment and the self will lead to obtaining career goals (Lent & Brown, 2013; Stumpf et al., 1983)	
Outcome expectations for environment exploration	The perceived probability that exploring the environment for career opportunities will lead to obtaining career goals	Career Exploration Survey: External Search Instrumentality (Stumpf et al., 1983)
Outcome expectations for self-exploration	The perceived probability that reflection on the self, past career behavior, and retrospection will lead to obtaining career goals	Career Exploration Survey: Internal Search Instrumentality (Stumpf et al., 1983)
Overall outcome expectations	Measures that combine outcome expectations for environment and self-exploration	Outcome Expectations Scale (Betz & Voyten, 1997; Lent et al., 2017)
<b>Career-exploratory goals</b>	The intention to engage in career exploration (Lent & Brown, 2013)	Career Exploratory Intentions Scale (Betz & Voyten, 1997)
<b>Openness</b>	The Big Five traits openness, conscientiousness, extraversion, agreeableness, and neuroticism (Goldberg, 1990)	Five Factor Model Short-Form Inventory (Hahn et al., 2012); Adjective Check List (Gough & Heilbrun, 1983)
<b>Conscientiousness</b>		
<b>Extraversion</b>		
<b>Agreeableness</b>		
<b>Neuroticism</b>		
<b>Career-related social support</b>	Social support for career development and decision-making provided by different sources (Lent et al., 2019; Lent & Brown, 2013)	
Family support	Support for career development and decision-making provided by family	Career-related support provided by family (Cheung & Arnold, 2010)
Peer support	Support for career development and decision-making provided by peers	Career-Related Peer Support Scale (Zhang & Huang, 2018)
Institutional support	Support for career development and decision-making provided by institutions	Career-related support provided by teacher (Cheung & Arnold, 2010)
Unspecific support	Unspecific support for career development and decision-making	Influence of Others on Academic and Career Decisions Scale: Support-Guidance (Nauta & Kokaly, 2001)
<b>Career-related barriers</b>	Social-interpersonal and contextual factors that impede engagement in career-developmental activities (Swanson & Tokar, 1991b)	
Social-interpersonal barriers	Disapproval of career choices and discouragement from pursuing career goals	Feedback on Career Goals: External Goal Suitability (Hu et al., 2017); Career Indecision Profile: Interpersonal Conflict (Hacker et al., 2013)
Contextual barriers	Unfavorable external or health-related circumstances	Perceived resource scarcity (Hu et al., 2020)
Overall barriers	Measures that combine social-interpersonal and contextual barriers	Career-Related Barriers Scale (Lent et al., 2005)
<b>Career decidedness and decision-making difficulties</b>	Degree of perceived decidedness and decision-making difficulties (reverse) regarding occupational career-related choices	
Career decidedness	Degree of perceived decidedness regarding occupational career-related choices (Jones, 1989)	Decidedness subscale of the Career Decision Profile (Jones, 1989)
Decision-making difficulties	Difficulties related to making career decisions that are necessary for career development (Gati et al., 1996)	Career Decision-Making Difficulties Scale (Gati et al., 1996); My Vocational Situation: Career Indecision (Holland et al., 1980)
<b>Decisional distress</b>	An anxious attitude toward or the experience of undesirable stress relative to making career choices (Osipow et al., 1976; Stumpf et al., 1983)	
Career self-doubt	Doubt, uneasiness, and worry about one's current career choice	Vocational Identity Status Assessment: Career Self-Doubt (Porfeli et al., 2011)
Commitment anxiety	Anxiety about committing to a career decision	Career Indecision Profile: Commitment Anxiety (Hacker et al., 2013)
Decision making confusion	Experience of disabling emotions and/or a lack of understanding about the decisionmaking process	Career Thoughts Inventory: Decision Making Confusion (Sampson et al., 1998)
Decisional stress	Undesirable stress experienced during the career decision making process, relative to other significant life events	Career Exploration Survey: Decisional Stress (Stumpf et al., 1983)
<b>Perceived employability</b>	The perceived ability to get the job one desires (Rothwell et al., 2008)	Self-Perceived Employability Scale (Rothwell et al., 2008)

Note. The superordinate constructs displayed in bold font in the first column are used to test the meta-analytic research model. The construct subcategories displayed in normal font are used in exploratory moderator analyses.

organizational psychology research and consider  $r_c < 0.15$  as negligible,  $r_c \geq 0.15$  as weak,  $r_c \geq 0.25$  as moderate, and  $r_c \geq 0.39$  as strong. All bivariate analyses were carried out via the *psychmeta* package (Dahlke & Wiernik, 2019) for the R statistical computing environment (R Core Team, 2019).

### 5.3.2. Mediation analysis

To test Hypotheses 4 and 5, we used a two-step random-effects meta-analytic structural equation modeling approach (TSSEM, Cheung, 2015a; Cheung & Chan, 2005). First, the sample-size weighted and reliability-corrected bivariate correlation matrices for each independent sample are pooled together. In the TSSEM approach, the total sample size is used for the estimation of the meta-analytic structural equation model (Cheung & Chan, 2005). In the second step, we fitted a path model to the pooled correlation matrix. Specifically, in addition to direct relationships of CSE and outcome expectations with career exploration, we defined indirect paths through career-exploratory goals. Since a model with indirect and direct effects included is fully saturated, we do not obtain fit values for our specified path model.<sup>6</sup> Indirect effects were considered statistically significant when their associated 95% confidence intervals do not include zero. Path analyses were carried out using the *metaSEM* package in R (Cheung, 2015b).

### 5.3.3. Moderation analyses

As part of our exploratory analyses, we tested for moderation by sample and study characteristics. We considered four continuous moderators, namely age, the percentage of female students in the sample, cultural background, and publication year. In line with other meta-analytic reviews (e.g., Wang et al., 2020), we used Hofstede's (2011) dimension of individualism versus collectivism to operationalize culture. Further, we considered three categorical moderators, namely publication status (i.e., published versus unpublished) and the career exploration measurement that was used (i.e. Stumpf et al. (1983) versus other<sup>7</sup>). Additionally, we examined moderation by criteria construct subcategories. For example, for the relationship between career-related barriers with career exploration, we considered contextual, social-interpersonal, and overall barriers as categorical moderators (see Table 1). To ensure that all moderator categories are adequately covered, we considered moderator analyses for constructs represented in at least  $k = 10$  independent samples (see Borenstein et al., 2011). Finally, for the sake of completeness, we examine categorical moderator effects if the moderator level includes  $k < 3$  independent samples. However, we interpret effects only if categorical moderator levels include  $k \geq 3$  independent samples.

### 5.3.4. Publication bias and sensitivity analyses

To examine whether studies with lower precision substantially changed the results of the meta-analytic analyses, we conducted cumulative meta-analysis (Borenstein et al., 2011). In cumulative meta-analysis, series of iterative meta-analyses are conducted, each adding one additional effect size for a specific relationship at a time. Effect sizes are added by decreasing precision. That is, effect sizes that are first entered represent the most exact estimates of the population effect size. If studies with lower precision bias the meta-analytic estimates, the cumulative results drift as less precise studies are added (Borenstein et al., 2011).

## 6. Results

### 6.1. Relationship between environment and self-exploration

The corrected correlation between environment and self-exploration was calculated based on  $k = 52$  studies ( $N = 13249$ ). It suggests that the two dimensions of career exploration are strongly and positively related ( $r = 0.49$ ;  $r_c = 0.57$ ;  $SD_c = 0.23$ ,  $\text{cor}(r, a = 0.24)$ ). Importantly, the 95% confidence interval (0.51 to 0.64) and the 80% credibility interval (0.28 to 0.87) do not include 1, suggesting that the two subdimensions of career exploration are distinct (Viswesvaran et al., 2002).

### 6.2. Antecedents of career exploration

Table 2 shows the results of the analyses of bivariate relationships between antecedent variables and career exploration.

#### 6.2.1. Cognitive-person factors

The results show a strong and positive relationship between CSE and career exploration ( $r_c = 0.52$ ). CSE was strongly and positively related to environment exploration ( $r_c = 0.42$ ) and moderately and positively to self-exploration ( $r_c = 0.36$ ). Outcome expectations were moderately and positively related to overall career exploration ( $r_c = 0.31$ ) and its two dimensions (environment exploration:  $r_c = 0.28$ ; self-exploration:  $r_c = 0.30$ ). Career-exploratory goals were strongly and positively related to career exploration ( $r_c = 0.42$ ) and moderately and positively to its two dimensions (environment exploration:  $r_c = 0.37$ ; self-exploration:  $r_c = 0.32$ ). Thus, we find support for Hypotheses 1 through 3.

<sup>6</sup> As indicated by Yu et al. (2018), with the absence of the measurement component, evaluating model fit based on commonly used fit indices may not be appropriate for the context of meta-analytic structural equation modeling (see also Cheung, 2015a).

<sup>7</sup> Only few studies used other measurements than the CES. We formed two broad categories to guarantee adequate coverage of moderator categories.

**Table 2**  
Results of bivariate relationships between career exploration and antecedent variables.

Antecedent variable	Career exploration dimension	<i>k</i>	<i>N</i>	<i>r</i>	<i>r<sub>c</sub></i>	<i>SD<sub>c</sub></i>	95% CI	80% CR	cor( <i>r</i> , <i>a</i> )
Self-efficacy for career exploration and decision-making	Career exploration	33	8936	0.47	0.52	0.17	0.46, 0.59	0.31, 0.74	0.31
	Env. exploration	17	3805	0.37	0.42	0.14	0.35, 0.49	0.25, 0.59	0.46
	Self-exploration	17	3805	0.31	0.36	0.10	0.31, 0.41	0.26, 0.45	0.70
Outcome expectations for career exploration	Career exploration	12	2262	0.26	0.31	0.17	0.21, 0.42	0.12, 0.51	0.49
	Env. exploration	10	1662	0.22	0.28	0.18	0.15, 0.40	0.06, 0.49	0.51
	Self-exploration	10	1662	0.26	0.30	0.21	0.15, 0.45	0.04, 0.56	0.42
Career-exploratory goals	Career exploration	10	2785	0.37	0.42	0.17	0.30, 0.53	0.20, 0.63	0.35
	Env. exploration	6	1470	0.32	0.37	0.20	0.16, 0.57	0.09, 0.64	0.34
	Self-exploration	6	1470	0.27	0.32	0.22	0.09, 0.54	0.01, 0.62	0.32
Openness	Career exploration	5	966	0.27	0.35	0.21	0.09, 0.60	0.06, 0.64	0.41
	Env. exploration	3	521	0.09	0.12	0.38	-0.82, 1.00	-0.57, 0.81	0.26
	Self-exploration	3	521	0.26	0.37	0.13	0.05, 0.70	0.22, 0.53	0.77
Conscientiousness	Career exploration	7	1566	0.23	0.29	0.13	0.16, 0.41	0.13, 0.44	0.60
	Env. exploration	3	521	0.22	0.30	0.20	-0.19, 0.78	-0.03, 0.62	0.49
	Self-exploration	3	521	0.18	0.26	0.12	-0.02, 0.55	0.17, 0.35	0.91
Extraversion	Career exploration	6	1166	0.16	0.20	0.12	0.07, 0.33	0.06, 0.33	0.69
	Env. exploration	3	521	0.21	0.26	0.07	0.09, 0.42	0.26, 0.26	1.00
	Self-exploration	3	521	0.10	0.13	0.18	-0.30, 0.57	-0.14, 0.41	0.55
Neuroticism	Career exploration	6	1166	-0.06	-0.08	0.17	-0.25, 0.09	-0.28, 0.12	0.55
	Env. exploration	3	521	-0.10	-0.13	0.04	-0.24, -0.02	-0.13, -0.13	1.00
	Self-exploration	3	521	-0.03	-0.05	0.18	-0.50, 0.39	-0.32, 0.22	0.59
Agreeableness	Career exploration	5	966	0.18	0.24	0.17	0.02, 0.45	0.01, 0.46	0.53
	Env. exploration	3	521	0.06	0.07	0.05	-0.06, 0.20	0.07, 0.07	1.00
	Self-exploration	3	521	0.08	0.11	0.18	-0.32, 0.55	-0.16, 0.38	0.58
Career-related social support	Career exploration	11	4548	0.28	0.33	0.22	0.18, 0.48	0.03, 0.62	0.24
	Env. exploration	5	2039	0.23	0.25	0.21	-0.01, 0.52	-0.06, 0.57	0.25
	Self-exploration	5	2039	0.26	0.30	0.29	-0.05, 0.66	-0.13, 0.74	0.19
Career-related barriers	Career exploration	13	4970	-0.13	-0.15	0.16	-0.24, -0.05	-0.35, 0.06	0.36
	Env. exploration	3	696	-0.09	-0.11	0.12	-0.41, 0.19	-0.29, 0.06	0.64
	Self-exploration	3	696	-0.10	-0.11	0.07	-0.28, 0.06	-0.11, -0.11	1.00

*Note.* CSE = self-efficacy for career exploration and decision-making; *k* = number of independent samples; *N* = cumulative sample size; *r* = sample size-weighted correlation; *r<sub>c</sub>* = sample size-weighted and reliability-corrected correlation; *SD<sub>c</sub>* = standard deviation of *r<sub>c</sub>*; CI = confidence interval for *r<sub>c</sub>*; CR = credibility interval; cor(*r*, *a*) = correlation between *r* and statistical artifacts.

**Table 3**  
Results of bivariate relationships between career exploration and outcome variables.

Outcome variable	Career exploration dimension	<i>k</i>	<i>N</i>	<i>r</i>	<i>r<sub>c</sub></i>	<i>SD<sub>c</sub></i>	95% CI	80% CR	cor( <i>r</i> , <i>a</i> )
Career decidedness and decision-making difficulties (reverse)	Career exploration	23	10,922	0.19	0.22	0.16	0.15, 0.29	0.02, 0.43	0.31
	Env. exploration	14	4772	0.16	0.18	0.14	0.10, 0.26	0.01, 0.35	0.44
	Self-exploration	14	4772	0.10	0.11	0.16	0.02, 0.20	-0.08, 0.31	0.40
Decisional distress	Career exploration	32	11,400	-0.08	-0.09	0.20	-0.16, -0.02	-0.33, 0.15	0.32
	Env. exploration	11	2759	-0.05	-0.07	0.28	-0.25, 0.12	-0.43, 0.30	0.27
	Self-exploration	11	2759	0.02	0.02	0.11	-0.05, 0.09	-0.08, 0.13	0.69
Employability	Career exploration	6	1567	0.30	0.35	0.08	0.28, 0.41	0.28, 0.41	0.79
	Env. exploration	4	654	0.31	0.37	0.15	0.13, 0.62	0.16, 0.59	0.55
	Self-exploration	4	654	0.14	0.17	0.09	0.03, 0.32	0.17, 0.17	1.00

Note. *k* = number of independent samples; *N* = cumulative sample size; *r* = sample size-weighted correlation; *r<sub>c</sub>* = sample size-weighted and reliability-corrected correlation; *SD<sub>c</sub>* = standard deviation of *r<sub>c</sub>*; CI = confidence interval for *r<sub>c</sub>*; CR = credibility interval; cor(*r*, *a*) = correlation between *r* and statistical artifacts.

### 6.2.2. Relationships of self-efficacy and outcome expectations with career exploration mediated by career-exploratory goals

A full model including the two independent variables (i.e., career-related self-efficacy and outcome expectations), the mediator (i.e., career-exploratory goals), and career exploration as dependent variable did not converge. Thus, we fitted two separate mediation models to our data (i.e., one for each independent variable). The pooled bivariate correlations were calculated using random effects meta-analysis (see Table 4). The estimated path coefficients are shown in Table 5. All paths were found to be positive and significant, except for the direct relationship between self-efficacy and career exploration. The 95% confidence interval of the two indirect effects excluded zero (for CSE:  $B = 0.14$ , 95% CI [0.05, 0.23]; for outcome expectations:  $B = 0.08$ , 95% CI [0.04, 0.12]). That is, we found support for Hypotheses 4 and 5.

### 6.2.3. Personality traits

Results of relationships between personality traits and career exploration are shown in Table 2. Openness was moderately and positively related to overall career exploration ( $r_c = 0.35$ ), and to self-exploration ( $r_c = 0.37$ ), but was unrelated to environment exploration. Conscientiousness was moderately and positively related to overall career exploration ( $r_c = 0.29$ ), and its two dimensions (environment exploration:  $r_c = 0.30$ ; self-exploration:  $r_c = 0.26$ ). We found a weak and positive relationship between extraversion and overall career exploration ( $r_c = 0.20$ ). While extraversion was moderately and positively related to environment exploration ( $r_c = 0.26$ ), it was unrelated to self-exploration. These results support Hypotheses 6 through 8. While neuroticism was unrelated to overall career exploration and self-exploration, it was negligibly and negatively related to environment exploration ( $r_c = -0.13$ ). Accordingly, Hypothesis 9 was not supported. Finally, regarding our first research question, we found a weak and positive relationship between agreeableness and career exploration ( $r_c = 0.24$ ). In contrast, agreeableness was unrelated to the two subdimensions.

### 6.2.4. Career-related support and barriers

Results of relationships career-related support and barriers with career exploration are shown in Table 2. Career-related social support was moderately and positively related to career exploration ( $r_c = 0.33$ ), but was unrelated to its two dimensions. Similarly, we found a weak and negative relationship between career barriers and overall career exploration ( $r_c = -0.15$ ), while it was unrelated to its two dimensions. This supports Hypotheses 10 and 11.

## 6.3. Outcomes of career exploration

Table 3 shows the results of the analyses of bivariate relationships between career exploration and outcome variables. The results showed a weak and positive relationship between overall career exploration and environment exploration with career decidedness/decision-making difficulties (career exploration:  $r_c = 0.22$ ; environment exploration:  $r_c = 0.18$ ), answering Research Question 2. The relationship between self-exploration and career decidedness was negligible and positive ( $r_c = 0.11$ ). In response to Research Question 3, we found a negligible and negative relationship between career exploration and decisional distress ( $r_c = -0.09$ ). If considered separately, environment and self-exploration were unrelated to decisional distress. Finally, regarding our fourth research question, we found a moderate and positive relationship between overall career exploration and environment exploration with perceived employability (career exploration:  $r_c = 0.35$ ; environment exploration:  $r_c = 0.37$ ).

Self-exploration was weakly and positively related to perceived employability ( $r_c = 0.17$ ).

## 6.4. Results of exploratory analyses

### 6.4.1. Demographic covariates

The overall mean age of students included in samples that were used in the meta-analysis was 21.01 ( $SD = 2.36$ ). The mean percentage of female students in the samples was 62.71. The correlations between demographic covariates and career exploration are presented in Table A1 in our Online Appendix (<https://osf.io/7yhbw/>). Age was negligibly and positively related to overall career

**Table 4**  
Pooled meta-analytic correlation matrix.

	1.	2.	3.	4.
1. Career exploration	1			
2. CSE	0.47	1		
3. Career-exploratory goals	0.45	0.44	1	
4. Outcome expectations	0.27	0.42	0.55	1

Note. CSE = self-efficacy for career exploration and decision-making.

exploration ( $r_c = 0.06$ ), and to self-exploration ( $r_c = 0.09$ ), while it was unrelated to environment exploration. Gender was unrelated to overall and dimension level career exploration. Finally, while SES was unrelated to overall career exploration and self-exploration, it was negligibly and negatively related to environment exploration ( $r_c = -0.06$ ).

#### 6.4.2. Multiple regression and relative weights analyses

Beyond tests of mediated effects, we tested a multivariate meta-analytic regression model to explore the incremental value of the three cognitive-person factors self-efficacy for career exploration and decision-making (CSE), outcome expectations, and career-exploratory goals in predicting career exploration directly. We conducted hierarchical least squares regression models using the same pooled correlation matrix as for our path analyses (Table 4). Following the suggestions by Viswesvaran and Ones (1995), we used the harmonic mean of the sample size across the correlations considered as the sample size for the estimated regression model. Additionally, we conducted relative weights analyses to capture the contribution of correlated predictors to the overall model (see Johnson, 2000). In relative weights analysis, raw relative weights are calculated to reflect the proportion of variance explained in the outcome that is attributed to each of the predictors, while rescaled relative weights reflect the percentage of variance that is explained by each predictor variable (see LeBreton et al., 2007).

A summary of the model results is shown in our Online Appendix in Table A2. The results suggest that each of the three person-cognitive variables exhibit incremental predictive validity. Specifically, CSE alone accounted for approximately 22.4% of the variance in career exploration. Career-exploratory goals accounted for additional 7.0%, and outcome expectations for additional 0.2% of the variance in career exploration. The regression weight of outcome expectations was negative, suggesting that if all three predictors were considered, outcome expectations were negatively related to career exploration. According to the rescaled relative weights, CSE was the dominant predictor of career exploration, accounting for 50.8% of the total variance explained, followed by career-exploratory goals, which accounted for 41.1% of the total variance explained.

#### 6.4.3. Moderation analyses

A summary of all categorical moderator analyses, along with results of Wald-type pairwise comparisons for each level of categorical moderators may be found in Tables A3 and A4 in our Online Appendix. Contrasts for the comparison of the relationship between career exploration and criterion subcategories are shown in Table A5. Finally, results of meta-regression models for continuous moderators are presented in Table A6.

We observed several moderation effects. First, the negative relationship between career-related barriers and career exploration (mean difference = 0.23, 95% CI [0.11, 0.35]) was weaker in unpublished compared to published studies. Regarding the moderation by criterion subcategory, we found the positive relationship of institutional social support to be stronger than the relationship with unspecific social support with career exploration (mean difference = 0.33, 95% CI [0.02, 0.65]). However, as can be seen from Table

**Table 5**  
Coefficients of mediation models with career-exploratory goals as mediator and career exploration as outcome variable.

Considered path	B	95% CI
Independent variable: CSE		
Direct paths		
CSE → Goals	0.49	0.42, 0.56
CSE → Exploration	0.21	-0.02, 0.43
Goals → Exploration	0.28	0.10, 0.46
Indirect path		
CSE → Goals → Exploration	0.14	0.05, 0.23
Independent variable: Expectations		
Direct paths		
Expectations → Goals	0.25	0.20, 0.29
Expectations → Exploration	0.47	0.39, 0.55
Goals → Exploration	0.33	0.17, 0.48
Indirect path		
Expectations → Goals → Exploration	0.08	0.04, 0.12

Note. CSE = self-efficacy for career exploration and decision-making; Goals = career-exploratory goals; Exploration = Career exploration; Expectations = Outcome expectations; B = Regression estimate; CI = confidence interval.



A3, the 95% CI for institutional social support included zero, indicating that the relationship of institutional support with career exploration was non-significant. Family career support was the only career-related social support subcategory significantly associated with career exploration. Moreover, the relationship of career exploration with career decidedness was stronger than with decision-making difficulties (mean difference = 0.18, 95% CI [0.04, 0.31]). Further, we found career exploration to be differently related to subcategories of decisional distress. Specifically, as can be seen from Table A3, career exploration was unrelated to commitment anxiety and decisional stress, while it was negatively related to career self-doubt and decision-making confusion. However, there were only two studies that assessed the relationship between career exploration and decision-making confusion. The relationship of career exploration with career self-doubt was stronger than the relationship with decisional stress (mean difference = 0.16, 95% CI [0.02, 0.34]).

Regarding the influence of continuous moderators, age increased the positive relationship between self-efficacy for career exploration and decision-making (CSE) and career exploration ( $B = 0.034$ , 95% CI [0.001, 0.067]). In addition, individualist culture was shown to attenuate the negative relationship between career-related barriers and career exploration ( $B = 0.004$ , 95% CI [0.003, 0.005]) and the positive relationship between career exploration and career decidedness ( $B = -0.003$ , 95% CI [-0.005, -0.001]). Moreover, the association of career exploration with both outcome expectations ( $B = -0.006$ , 95% CI [-0.009, -0.002]), and career decidedness ( $B = -0.011$ , 95% CI [-0.016, -0.005]) were attenuated by the percentage of female students in the sample. Finally, the relationship between outcome expectations and career exploration was attenuated by publication year ( $B = -0.007$ , 95% CI [-0.014, -0.001]), and the relationship between career exploration and career decidedness was enhanced by publication year ( $B = 0.023$ , 95% CI [0.002, 0.045]). That is, studies published later reported weaker relationships between outcome expectations and career exploration and stronger relationships between career exploration and career decidedness than studies published earlier.

### 6.5. Sensitivity analyses

The results of our cumulative meta-analyses are shown in Fig. A1 in the Online Appendix. In summary, we noticed two slight “drifts”: The correlations for outcome expectations drifted toward a stronger positive value, while the correlations for neuroticism drifted toward zero as less precise studies were added. Detailed cumulative meta-analytic results for these variables are shown in Table A7 in our Online Appendix. After half of the studies were added, the relationship between outcome expectations and career exploration was weaker than after all studies were included (at  $k = 6$ ,  $r_c = 0.26$ ). However, the confidence intervals of the estimated correlation excluded zero and the effect was still moderate in size. Thus, the slight drift did not influence our meta-analytic conclusions. Moreover, after half of the studies were added, the relationship between career exploration and neuroticism was slightly stronger negative than the one estimated as part of our focal analyses (at  $k = 3$ ,  $r_c = -0.17$ ), suggesting that the strength of the relationship between neuroticism and career exploration may have been underestimated.

## 7. Discussion

### 7.1. Summary and interpretation of findings

Based on the CSM (Lent & Brown, 2013), the primary goal of our meta-analysis was to achieve a better understanding of the factors that predict and the outcomes that result from students' career exploration. Our meta-analytic results support the applicability of the CSM model to the context of students' career exploration. Regarding the antecedents of career exploration, we found the three cognitive-person factors CSE, outcome expectations, and career-exploratory goals to promote students' career exploration. Notably, while most of the relationships found in our meta-analysis were moderate in size, the relationships of CSE and exploratory goals with career exploration were strong. As expected, the relationship of CSE and outcome expectations with career exploration was mediated by career-exploratory goals. Thus, students who feel self-efficacious and expect that their career-exploratory efforts would pay off are more likely to set goals to engage in career exploration, which, in turn, enhances their career exploration. Notably, career-exploratory goals *fully* explained the relationship of CSE and *partly* explained the relationship of outcome expectations with career exploration. We further found support for most of the hypothesized relationships between personality factors and career-related support and barriers with career exploration. Specifically, openness, conscientiousness, extraversion, and agreeableness were positively related to career exploration. In contrast, neuroticism was unrelated to career exploration. Finally, feeling supported regarding one's career development motivated and the perception of career-related barriers hampered career exploration.

Regarding outcomes, our results indicate career exploration to enhance students' readiness to decide on a particular career path, diminish the experience of decisional distress, and enhance students' perceived employability. However, career exploration was differently associated with distinct facets of decisional distress. Specifically, career exploration was negatively related to career self-doubt (i.e., doubts about one's career choice), while, at the same time, it was unrelated to decisional stress (i.e., undesirable stress experienced during the decision-making process) and commitment anxiety (i.e., anxiety about committing to a career decision). Career exploration aims to provide students with career-related information that may help reduce doubts and uncertainty related to the decision-making process. However, as students often feel under high pressure to make the right career decision, the process of obtaining this information may be stressful for some of them (Stumpf et al., 1983), possibly explaining the lack of a relationship between career exploration and decisional stress. Finally, career exploration may reduce the lack of information associated with commitment anxiety. At the same time, it may enhance the number of cognitively available career options, thus fostering other aspects of commitment anxiety, such as conflicts arising when trying to choose between two desirable options (i.e., approach-approach conflict, Hacker et al., 2013).

Regarding the link with demographic covariates, we found a positive, albeit negligible, relationship between age and overall career exploration as well as self-exploration. As older students are likely further along in their studies, they may feel more motivated to engage in career exploration to prepare for the upcoming transition from university to work and find jobs that integrate with their values and past career behavior (Ketterson & Blustein, 1997). Surprisingly, SES was negatively related to environment exploration. One possible explanation may be that students with higher SES are more optimistic about their future career (Eshelman & Rottinghaus, 2015), consequently investing less effort into exploring possible career paths.

Notably, we found weak, negligible, or no relationships between career exploration and all negative antecedents and outcome variables included in our meta-analysis (i.e., neuroticism, career-related barriers, decisional distress). In the same vein, career exploration was moderately associated with career decidedness but weakly with decision-making difficulties. These findings align with research indicating that the relationship of proactive behavior with other variables may be context-dependent (see Belschak et al., 2010). For example, some students may try to cope with career-related barriers by exploring careers if they possess enough resources (e.g., social support by family members). Additionally, the consequences of career exploration may depend on the outcomes obtained. For example, the exploration of the environment and the self may, in some cases, reveal a lack of preparedness for one's future career, thus enhancing negative emotions associated with the decision-making process.

We found differences in the strength of the relationship of some criterion variables with environment versus self-exploration. Specifically, CSE, extraversion, neuroticism, career decidedness, and perceived employability were more strongly related to environment than to self-exploration. At the same time, openness to experience was moderately and positively associated with self-exploration and unrelated to environment exploration. Self-efficacy is a primary motivator of behavior and behavioral change, possibly explaining the stronger link with environment than with self-exploration (Bandura, 1977). Moreover, Lent and Brown (2013) propose extraversion to facilitate and neuroticism to complicate adaptive career behaviors that involve social interaction, which may explain the stronger link of these personality variables with environment exploration. Further, students' environment exploration may produce immediate tangible career-related outcomes, such as obtaining relevant career information, thus possibly affecting career decidedness and perceived employability more strongly than self-exploration does. Finally, openness to experience predominantly refers to cognitive processes such as intellectual efficiency, curiosity, or introspection (Connelly et al., 2014). The emphasis of cognitive processes may explain the lack of a relationship between openness to experience and environment exploration as the behavioral dimension of career exploration.

The results of moderator analyses show that the older the students are, the stronger is the link between CSE and career exploration. This finding is in line with research findings indicating the relationship between task-specific self-efficacy and effort expenditure to be moderated by employee age (Gärtner & Hertel, 2020). Individuals who perceive the time remaining to complete a task as limited may try to prevent unnecessary effort that delays task completion by engaging in effortful behaviors only if they believe they can successfully perform that behavior (Gärtner & Hertel, 2020). Applied to the context of the current meta-analysis, because older students are likely further along in their studies, they may base their decision to engage in career exploration more strongly on self-efficacy beliefs. In addition, the percentage of female students in a sample attenuates both the positive relationship between outcome expectations and career exploration and between career exploration and career decidedness. Previous research indicates that women may be more strongly influenced by role models in their career development than men (e.g., BarNir et al., 2011), possibly explaining the attenuating effect of female gender on these relationships. Moreover, we found cultural individualism to attenuate the negative association of career-related barriers and the positive association of career decidedness with career exploration. Eight of 13 career-related barriers were social barriers (e.g., lack of parental support). Thus, this finding aligns with research suggesting a somewhat weaker link between social influencing factors and career exploration in individualist compared to collectivist countries (Auyeung & Sands, 1997; Hofstede, 2011).

Finally, we observed several moderation effects by study characteristics. The correlation between outcome expectations and career exploration was weaker, while the correlation between career exploration and career decidedness was stronger in more recently published studies. This finding points to the possibility of cohort differences for these relationships. For example, due to the increasing responsibility individuals take for their career development (Sullivan, 2011) students' career exploration may have become more of a routine task that depends less on the expectation that it will yield them the desired results. In addition, over the past decades, individuals have become more self-directed in their career development (Sullivan, 2011). Thus, their career decidedness may depend more strongly on (the results of) career exploration than, for example, economic constraints or socially prescribed role models. Moreover, the relationship between outcome expectations and career exploration was stronger in unpublished than in published studies. In contrast, the association of career exploration with both support and barriers was weaker in unpublished studies. These findings highlight the importance of considering unpublished data in meta-analyses on career exploration to prevent over- or underestimating effect sizes due to publication bias (see also Harari et al., 2020). Although we examined the influence of multiple moderating factors, it has to be noted that the credibility intervals of the relationship of some variables with career exploration for which we observed no moderation effects were relatively wide (e.g., the 80% credibility interval for the relationship between openness and career exploration ranged from 0.06 to 0.64, for agreeableness 0.01 to 0.46). The width of the credibility intervals highlights true between-study heterogeneity (Schmidt & Hunter, 2015), suggesting that there may be factors we did not consider in the current meta-analysis that influence the strength of the relationship between career exploration and these variables.

## 7.2. Theoretical implications

While our meta-analytic results generally support the applicability of the CSM model to the context of students' career exploration, they may help to refine some of its predictions. First, the findings suggest slightly revising the CSM model by considering the difference

between the effects of CSE and outcome expectations on students' career exploration as being fully versus partly mediated by exploratory goals. Interestingly, relative weights analysis results indicate that when taking all three predictors into account, outcome expectations do not explain additional variance in career exploration above and beyond the effects of CSE and exploratory goals. That is, although our findings highlight the relevance of person-cognitive variables for students' career exploration, they also suggest a clear "order of importance", with CSE being the most important and outcome expectations being the least important person-cognitive predictor of career exploration.

Second, differences in the size of the relationships of the variables included in the meta-analysis with environment versus self-exploration raise doubts about the appropriateness of examining the two career exploration dimensions as part of the same process. Currently, the CSM model does not offer different predictions for the relationships between career-related variables and environment and self-exploration separately. We suggest refining the CSM model by integrating theoretically grounded paths that lead from career-related variables to environment and self-exploration as two separate constructs.

Finally, the findings speak in favor of integrating antecedents of career exploration that have not formally been considered in [Lent and Brown \(2013\)](#) seminal article. That is, while [Lent and Brown \(2013\)](#) consider conscientiousness, openness, extraversion, and neuroticism, we found evidence for all Big Five personality traits except for neuroticism as predictors of career exploration. Additionally, the results suggest including career decidedness, decisional distress, and perceived employability as outcomes of career exploration in the CSM model. Our findings highlight the importance of considering fine-grained constructs rather than construct categories as antecedents and outcomes of career exploration. That is, we found career exploration to be negatively related to decision-making confusion and career self-doubt but unrelated to other forms of decisional distress. Similarly, the only subcategory of career-related social support that was associated with career exploration was support provided by the family. Future theory development should strengthen the theoretical foundation for the relationships between specific career-related variables and career exploration. In summary, we propose extending the CSM model ([Lent & Brown, 2013](#)) consistent with our meta-analytic results.

### 7.3. Limitations and implications for future research

We acknowledge several limitations of this study. First, although we meta-analytically examined most of the relationships described in the CSM model, a test of all paths included in the CSM model was beyond the scope of our study ([Lent & Brown, 2013](#)). For example, we did not test the effects of contextual support and barriers on career exploration, mediated by career-exploratory goals. Future research may complement our findings by considering paths of the CSM model not included in the current meta-analysis.

Second, we found the relationship between career-related barriers and career exploration to be stronger negative in published compared to unpublished studies. Although we included multiple unpublished data sets accessible through online platforms, our efforts to obtain unpublished data from authors directly were unsuccessful. Accordingly, we cannot rule out that due to the potential influences of the file-drawer phenomenon, our meta-analytic estimates may be biased for some relationships (see [Dalton et al., 2012](#)).

Third, most of the studies included in our meta-analytic summary used self-report measurements, possibly increasing the risk of common method bias ([Podsakoff et al., 2003](#)). Future studies should make more use of other-rated variables (e.g., provided career-related support rated by family members). Furthermore, because our meta-analytic estimates are based on primary studies focusing on cross-sectional relationships, we cannot rule out the possibility of reverse effects. For example, while [Lent and Brown \(2013\)](#) propose decisional distress to be an outcome of career exploration, [Stumpf et al. \(1983\)](#) outline how explorational and decisional stress enhance future career exploration. Using data assessed at multiple time points may help rule out the possibility of reverse causality.

The findings of the current meta-analysis highlight several opportunities for future research. To begin with, differences in the relationship between criterion variables and environment versus self-exploration suggest that it may be more appropriate to consider the two dimensions as separate constructs instead of forming a composite score that reflects overall career exploration. Relatedly, most studies considered in our meta-analysis assessed career exploration with the CES, thus focusing on the *content* of career exploration (i.e., the exploration of the environment versus the self). Alternative instruments used to measure career exploration, such as the VISA, differentiate between in-breadth and in-depth career exploration. While in-breadth career exploration has been shown to promote flexibility and discovery, it is associated with a lack of confidence and clarity. On the contrary, in-depth career exploration has been associated with less doubt about career choices and increased planning ([Porfeli & Lee, 2012](#)). [Porfeli and Lee \(2012\)](#) describe an optimal sequence of in-breadth followed by an in-depth career exploration during times of establishing a sense of career-related self such as the college years. Future research may benefit from considering both the content and depth of students' career exploration. This approach may be coupled with investigations of career exploration across different developmental stages. For example, when students are in the throes of establishing a career-related self at the beginning of their studies, they may benefit from opening up to diverse career options (e.g., through in-breadth environment and self-exploration). In contrast, those just about to graduate may benefit less from diverse reflective (e.g., in-breadth self-exploration) and more from specific behaviorally-oriented career exploration (e.g., in-depth environment exploration) (see [Blustein et al., 1989](#); [Porfeli et al., 2011](#)).

### 7.4. Practical implications

Our findings show that supporting students' career exploration may help them to make career decisions, be less doubtful or confused throughout the decision-making process, and enhance their perceived employability. Notably, family support was the only subcategory of career-related social support significantly associated with career exploration. Accordingly, students may be advised to request support from their family regarding their career development and use the support they get as a resource for exploring career options and themselves.

Among all antecedents considered, CSE exhibited the strongest link with career exploration. Accordingly, counselors who seek to encourage students to explore their career options should ensure that students believe in their abilities to engage in career exploration. The observed moderation effect by chronological age suggests that such interventions may be particularly beneficial among older students who are likely temporally closer to the transition from university to work.

Finally, the meta-analytic results suggest that exploring career options is more strongly related to career decidedness among male than female students. Student counselors may bear in mind these potential gender effects and provide information about how career exploration may ease the decision-making process, thus possibly strengthening the relationship between career exploration and career decidedness across genders.

## 7.5. Conclusion

The results of our meta-analysis indicate that career exploration is associated with most of the cognitive-person, personality, and contextual antecedents and mechanisms proposed in the CSM model (Lent & Brown, 2013). Moreover, career exploration was positively related to career decidedness and perceived employability and negatively related to specific forms of decisional distress. CSE, extraversion, neuroticism, career decidedness, and perceived employability were more strongly related to environment than self-exploration, whereas openness to experience was more strongly associated with self-exploration. The results of meta-analytic path models suggest that career-exploratory goals mediated the relationship of both CSE and outcome expectations with career exploration. The results of relative weights analysis indicate that CSE is the strongest person-cognitive predictor of career exploration. Finally, the findings illuminate person (i.e., age, gender, and cultural background) and study characteristics (i.e., publication status, criterion subcategory) that influence the strength of some relationships considered. This meta-analysis has potential to stimulate further research on the application of the CSM model to the context of students' career exploration and encourage career counselors to develop environments that encourage students to explore their career options and themselves.

## CRedit authorship contribution statement

**Anne-Kathrin Kleine:** Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Visualization, Project administration. **Antje Schmitt:** Validation, Writing – review & editing, Project administration. **Barbara M. Wisse:** Writing – review & editing, Project administration.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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