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The Relationship Between Personality and Flow: A Meta-Analysis

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ABSTRACT

Objective: This meta-analysis explores the relationship between Big Five personality traits and flow. It also examines the moderating roles of demographic factors (i.e., gender and age), cultural differences, contextual variations, flow dimensions, and the instruments used to assess personality and flow.

Method: A systematic search was conducted across ProQuest, Scopus, and Web of Science, identifying 24 eligible studies reporting associations between Big Five traits and flow. A total of 352 effect sizes were analyzed using a three-level random-effects model. Moderator analyses examined the influence of demographic, cultural, contextual, and methodological factors.

Results: Results reveal a medium-sized positive association between Conscientiousness and flow ($r = 0.33$), while Extraversion ($r = 0.25$), Openness ($r = 0.18$), and Agreeableness ($r = 0.16$) show smaller positive relationships. Neuroticism has a small negative relationship with flow ($r = -0.16$). Significant moderating effects were identified for culture, with stronger correlations in Eastern cultures for Extraversion, Openness, and Agreeableness.

Conclusions: These findings emphasize the importance of considering personality traits when studying flow. Future research should expand cross-cultural studies, explore flow across a broader range of contexts, incorporate multimodal measurement techniques, and develop interventions that enhance flow experiences by aligning them with individuals' personality profiles and contextual characteristics.

1 | Introduction

In recent years, the concept of flow, defined by Csikszentmihalyi (2008) as a state of optimal experience characterized by complete absorption in an activity, heightened focus, and a sense of enjoyment, has gained significant attention across various fields. Flow is characterized by various dimensions, referred to as the characteristics and conditions (i.e., antecedents) of flow. The characteristics include concentration (i.e., being fully concentrated on the task at hand), merging of action and awareness, loss of self-consciousness, sense of control (i.e., a feeling of having control over one's own actions), distortion of time, and an intrinsically rewarding experience (e.g., Abuhamdeh 2020; Csikszentmihalyi 2008; Nakamura and Csikszentmihalyi 2020). The conditions include perceived challenges, clear proximal goals, and immediate feedback about

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the progress (e.g., Abuhamdeh 2020; Csikszentmihalyi 2008; Nakamura and Csikszentmihalyi 2020). Flow experience is associated with numerous positive outcomes such as enhanced performance (e.g., Engeser and Rheinberg 2008), creativity (e.g., Byrne et al. 2003), and well-being (Asakawa 2010; Ilies et al. 2017; Wu et al. 2021). Given these benefits, the experience of flow is crucial across various contexts. For instance, in the workplace, fostering flow can lead to higher productivity, job satisfaction, and innovation (Peifer and Wolters 2021). In sports, flow is often linked to peak performance and a deep sense of enjoyment (Carter et al. 2013). Leisure activities and people's everyday lives also benefit from flow, leading to greater fulfillment and development (e.g., Elkington 2017; Freire et al. 2016). In education too, flow positively relates to various motivational indicators, such as well-being (e.g., Heutte 2017, 2020; Heutte et al. 2021). However, some studies caution against interpreting it as a desirable state. For instance, Keller et al. (2011) showed that participants under conditions of skills–demands compatibility exhibited reduced heart rate variability and elevated levels of salivary cortisol, both of which are associated with mental workload and stress. In addition, research has also highlighted a so-called dark side of flow. For instance, in a series of studies with kayakers and climbers, Schüler and Nakamura (2013) demonstrated that flow was associated with heightened self-efficacy, which in turn led to lower perceived risk and more risk-taking behavior. Furthermore, in online environments, flow has been linked to problematic internet use and online procrastination (Thatcher et al. 2008; Yang et al. 2014).

The experience of flow is context-dependent (e.g., Maeran and Cangiano 2013). For instance, whether a task provides real-time information about progress can directly determine the presence of specific flow conditions (e.g., immediate feedback). In addition, certain contextual features may not define a flow condition per se but rather influence how that condition contributes to the experiential characteristics of flow (Engeser and Rheinberg 2008). For instance, Engeser and Rheinberg (2008) found that when an activity carries high stakes, worries about mistakes or fear of failure can suppress flow experience, even when the challenge and skill levels are matched. In contrast, in low-stakes contexts, flow followed a classic inverted-U pattern, peaking under balanced conditions.

In addition to contextual characteristics, individual differences also play a significant role in fostering flow experiences. Research suggests that certain individuals are more prone to experiencing flow than others (e.g., Tse et al. 2021, 2020, 2025; Ullén et al. 2012). Within the field of personality psychology, this interindividual variability has been linked to the concept of autotelic personality, originally introduced by Csikszentmihalyi et al. (1997) to describe a set of dispositional characteristics that facilitate flow across activities and life domains (Tse et al. 2025). More recently, Tse et al. (2020) defined it as a "constellation of dispositional attributes that facilitate engagement and enjoyment in daily activities" (p. 88). Aligning with previous research (e.g., Baumann 2012), Tse et al. (2020) further refined and operationalized the construct through a multidimensional framework identifying seven core dispositions: "(a) curiosity and interest in life, (b) persistence, (c) low self-centeredness, (d) intrinsic motivation, (e) enjoyment and transformation of boredom, (f) enjoyment and transformation of challenges, and (g) attentional control" (p. 89).

1.1 | The Relationship Between Personality and Flow

To capture autotelic personality, researchers have studied the relationship between personality traits and flow, encompassing both flow experience and flow proneness, in various settings (Heller et al. 2015; Kranjčev and Vukasović Hlupić 2021). Most research in this direction used the Big Five Model of Personality, encompassing the traits Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (Chmielewski and Morgan 2013; McCrae and Costa 2008; Soto and John 2017). Previous research on the relationship between the Big Five personality traits and flow in various settings reveals distinct patterns for each trait, further outlined hereunder.

1.1.1 | Openness and Flow

Openness has generally been found to be positively associated with flow, though the strength of this relationship varies across studies. For instance, Bassi et al. (2014) reported a correlation of 0.25; Marty-Dugas and Smilek (2019) found correlations of 0.43, 0.24, and 0.23 across different contexts; and Sobhanmanesh (2022) observed a correlation of 0.37. Tian and Ou (2023) reported a stronger correlation ($r = 0.58$), whereas Ross and Keiser (2014) found a smaller association ($r = 0.03$). Individuals high in Openness exhibit facets such as intellectual curiosity, creativity, and imagination (Sparkman 2020), which foster engagement with novel and stimulating activities that are conducive to flow (Annalakshmi et al. 2020; Sobhanmanesh 2022). These individuals are more likely to explore new experiences, immerse themselves deeply in tasks, and also maintain intrinsic motivation (Annalakshmi et al. 2020).

1.1.2 | Conscientiousness and Flow

Conscientiousness has consistently been found to have a positive relationship with flow across a range of studies. For example, Bassi et al. (2014) reported a correlation of 0.16; Ross and Keiser (2014) reported a correlation of 0.42; Marty-Dugas and Smilek (2019) found correlations of 0.65, 0.51, and 0.47 across different contexts; Sobhanmanesh (2022) observed a correlation of 0.43; and Tian and Ou (2023) found a strong association of 0.61. Conscientious individuals are characterized by traits such as self-discipline, organization, goal orientation, and attentional control (Kern 2020), all of which are considered fundamental for inducing flow (Csikszentmihalyi 2008). These traits allow individuals to maintain focus on tasks, manage challenges effectively, and regulate their efforts toward achieving goals, thereby fostering the conditions for flow (Tian and Ou 2023). Conscientiousness is also associated with a strong desire to work hard, intrinsic motivation, and problem-solving (Kern 2020), which are critical for maintaining engagement with challenging and meaningful tasks (Annalakshmi et al. 2020; Sobhanmanesh 2022). In addition,

individuals high in Conscientiousness are more likely to select and persist in tasks that balance challenge and skill, which is a core requirement for flow experiences (Demerouti 2006). Those individuals are also better equipped to regulate their impulses and sustain focused attention, enhancing their ability to immerse themselves fully in their activities (Tian and Ou 2023).

1.1.3 | Extraversion and Flow

Extraversion has been positively linked to flow experiences across a range of studies. For example, Ross and Keiser (2014) found a correlation of 0.35; Marty-Dugas and Smilek (2019) reported correlations of 0.14, 0.26, and 0.38 across different contexts; Sobhanmanesh (2022) observed a correlation of 0.38; and Tian and Ou (2023) reported a stronger association of 0.54. Individuals high in Extraversion tend to seek social stimulation, novelty, and excitement (Annalakshmi et al. 2020), characteristics that align well with the types of engaging and stimulating tasks that often foster flow. Furthermore, these individuals are typically described as cheerful, enthusiastic, and energetic (Walker 2020), characteristics that may increase their likelihood of immersing themselves fully in activities conducive to flow.

1.1.4 | Agreeableness and Flow

Several studies have reported a positive relationship between Agreeableness and flow. For instance, Bassi et al. (2014) found a modest correlation ($r = 0.18$); Marty-Dugas and Smilek (2019) reported positive correlations across different contexts ($r = 0.37$, 0.38, and 0.43); Sobhanmanesh (2022) reported a similar association ($r = 0.20$); and Tian and Ou (2023) observed a notably stronger correlation in the context of learning flow experiences ($r = 0.55$). Agreeableness encompasses traits such as kindness, empathy, and a tendency toward harmonious interpersonal relationships (Tobin and Graziano 2020), which may create a favorable climate for flow under certain conditions. However, findings are not entirely consistent. Ross and Keiser (2014), for example, found a small negative correlation ($r = -0.17$), highlighting the need to consider potential moderating factors that may influence the relationship between Agreeableness and flow.

1.1.5 | Neuroticism and Flow

Most research indicates a negative relationship between Neuroticism and flow. For example, Ross and Keiser (2014) found a correlation of −0.42; Marty-Dugas and Smilek (2019) reported correlations ranging from −0.44 to −0.28 across different contexts; and Sobhanmanesh (2022) reported −0.36. However, one study by Tian and Ou (2023) found a contrasting positive association ($r = 0.59$), suggesting potential variability depending on context or measurement approach. The relationship between Emotional Stability (i.e., the conceptual opposite of Neuroticism) and flow has also been explored; Bassi et al. (2014), for instance, reported a small positive correlation ($r = 0.06$). Individuals with high Neuroticism are more likely to experience negative emotions such as anxiety, worry, and sadness and often struggle with stress management, emotional regulation, and impulse control (Zhang 2020). These tendencies may hinder their ability to fully engage in the present moment and achieve the immersive state required for flow.

1.2 | Possible Moderator Variables of the Link Between Personality and Flow

In examining the relationship between personality and flow, and in understanding the differences observed across the studies referred to above, various moderating variables could play a significant role. The following sections provide a detailed exploration of these moderators.

1.2.1 | Culture

Asakawa (2010) raised the need for comparing the flow state across Eastern and Western cultures, because culture might affect how people experience flow. Csikszentmihalyi and Asakawa (2016) noted that Japanese individuals "engage in activities—even boring and obligatory ones—by automatically evaluating their own actions in terms of others' expectations or socially shared standards to keep the group harmony" (p. 11). In such cases, when positive feedback is received, this can lead to experiencing flow. In contrast, individuals from Western cultures are more likely to assess their performance based on feedback aligned with their personal standards, which may affect flow in a different way (Csikszentmihalyi and Asakawa 2016). As such, culture might be an influential moderator for the personality-flow relationship.

1.2.2 | Gender

Another potential moderator is gender. Some research suggest that flow experiences might vary slightly between men and women (Habe et al. 2019). However, the literature presents mixed findings on this topic (Annalakshmi et al. 2020), with some studies not supporting gender differences in flow experiences (Isham and Jackson 2023; Kee and John Wang 2008). For example, in a sample of elite musicians and top athletes, Habe et al. (2019) found that flow was reported more often among male performers compared to female performers. In contrast, using measures of flow proneness in an adult sample, Isham and Jackson (2023) found no significant differences across gender, neither did Kranjčev and Vukasović Hlupić (2021). Moreover, in relation to the personality-flow link specifically, Coleman et al. (2018) found a significant positive correlation between Neuroticism and flow for boys ($r = 0.11$), while this correlation for girls was non-significant ($r = -0.01$). This suggest that gender may act as a moderator in the Neuroticism-flow relationship.

1.2.3 | Age

According to Freire et al. (2021) flow experiences vary across different life stages. The authors note that the effect of personality traits on flow continues to be important from early childhood, with temperament, through to adulthood, with traits such

as openness to experience. However, only a limited number of studies have actually studied the relationship between age and flow in a quantitative manner (Isham and Jackson 2023). In a study of Tse et al. (2022), age showed a minimal to small positive correlation with the experience of flow during adulthood. Similarly, Isham and Jackson (2023) found that demographic factors played a minimal role in accounting for flow proneness. In a recent study by Kranjčev and Vukasović Hlupić (2021), age was found to be a significant positive predictor of flow proneness in both work and leisure contexts. Since the contexts and individual factors influencing flow shift, to a certain extent, with age, including age as a moderator in a meta-analysis can further reveal how the personality-flow relationship evolves over the lifespan.

With regards to the moderation effect specifically, Kocjan and Avsec (2017) examined the personality-flow relationship in two distinct samples: one consisting of employees with an average age of 39.1 years, and the other of students with an average age of 19.3 years. While most correlations between personality traits and flow were similar across both groups, a notable difference emerged in the Agreeableness-flow link. In the employee sample, the correlation was non-significant ($r = 0.03$), whereas in the student sample, it was significant ($r = 0.24$), suggesting that the relationship between Agreeableness and flow may vary depending on age.

1.2.4 | Context

As highlighted by various researchers (Moneta and Csikszentmihalyi 1996; Tse et al. 2020), experiencing more flow might suggest that a person is situated in an environment that provides clear goals and immediate feedback, rather than directly indicating their autotelic personality. Experimental research has also demonstrated the significance of context in influencing flow experience (e.g., Demir and Seferoglu 2021). For instance, Demir and Seferoglu (2021) found that students engaged in pair programming reported higher levels of flow compared to those working solo. Furthermore, studies (e.g., Bryce and Haworth 2002) reflect that adults experience flow more frequently in work settings compared to leisure. This highlights the importance of context in influencing flow experiences.

Marty-Dugas and Smilek (2019) examined the relationship between personality and flow across different contexts, distinguishing between internal contexts (e.g., while thinking) and external contexts (e.g., playing a sport). Their findings revealed similar patterns across both types. Similar comparisons were done in the research of Ross and Macintyre (2020), who addressed the following research question: "What are the patterns of correlation between ratings of flow and the Big Five traits, and do they differ between physical and mental activities?" (p. 25). Their results indicated that Conscientiousness and Intellect (sometimes used as a synonym for Openness) had significant positive correlations with flow frequency in mental activities, whilst Agreeableness, Extraversion, and Emotional Stability showed no significant relationships. For physical activities, none of the Big Five traits were significantly correlated with flow experiences. In conclusion, while Marty-Dugas and Smilek (2019) propose that the relationship between personality and flow remains consistent across different contexts, Ross and Macintyre (2020) present contrasting findings, indicating that some relationship may vary depending on the type of activity or context.

1.2.5 | Flow Dimensions

As outlined earlier, flow is a multi-dimensional construct that encompasses both conditions (e.g., clear goals) and characteristics (e.g., loss of self-consciousness). These dimensions may not be equally influenced by personality traits. Therefore, considering the specific flow dimensions when examining the relationship between personality and flow allows for a more nuanced understanding.

1.2.6 | Big Five Scale and Flow Scale

Differences across studies might also be related to the specific instrument used for assessing personality. Various scales are used for assessing big five personality measures (Ashton 2013; Debell et al. 2022). Although many of these scales are closely related, there might be slight discrepancies across some dimensions (e.g., Iwasa and Yoshida 2018). Hence, it is important to look at the potential moderating effect of the personality scale when studying the relationship between personality and flow.

Similarly, flow scale could serve as a moderator in the personality-flow relationship because different flow scales may measure flow in a different way (Rosas et al. 2023), leading to potential discrepancies in the results. For instance, some instruments focus on flow proneness or dispositional flow (e.g., DFS-2), which assesses an individual's general tendency to experience flow across various activities, while others retrospectively measure the intensity of flow during specific activities (e.g., FSS-2; Jackson and Eklund 2002). Furthermore, as discussed by Rosas et al. (2023), not all instruments include all dimensions of flow. For example, the FSS includes all dimensions referred to earlier, whereas the work-related flow inventory (WOLF; Bakker 2008) includes absorption, enjoyment of work, and intrinsic motivation for work, and the EduFlow scale (Heutte et al. 2016, 2021) includes the dimensions of cognitive control, immersion and time-transformation, loss of self-consciousness, and autotelic experience.

1.3 | Research Gap Identification

Understanding the relationship between personality traits and flow is of significant importance (e.g., Tse et al. 2020), and while previous research (e.g., Marty-Dugas and Smilek 2019; Ross and Keiser 2014) has provided valuable insights, several gaps remain, necessitating a comprehensive meta-analysis. First, while many studies have demonstrated positive relationships between traits such as Openness and Conscientiousness and flow, there is considerable inconsistency in findings, particularly for Neuroticism. These inconsistencies can be addressed through a meta-analysis, which aggregates data from multiple studies to

provide a more comprehensive and synthesized understanding of the personality-flow relationship.

Second, most existing research has been conducted in specific contexts, such as educational or workplace settings, but there is a lack of comprehensive analysis across diverse contexts like sports, leisure, and creative activities. A meta-analysis can help determine whether the relationship between personality traits and flow varies significantly across these different environments.

Third, the role of additional moderating variables, such as measurements, demographic factors of participants, cultures, and contextual differences of the studies, has not been thoroughly investigated. A meta-analysis can systematically evaluate these moderators to understand how they impact the relationship between personality and flow, providing comparisons for different populations and settings.

1.4 | Research Aims and Research Questions

To address the aforementioned gaps, this study synthesizes empirical findings from studies investigating the link between the Big Five personality traits and flow. To achieve this, the present study employs a meta-analytical approach. By aggregating data from multiple sources, meta-analyses not only provide a comprehensive overview of the current evidence but also offer a more precise estimation of overall effect sizes, as outlined by Fernández-Castilla et al. (2024). This methodology improves the generalizability of results and enables the evaluation of variability between studies as well as the detection of possible moderator effects. Given these advantages, meta-analyses are often regarded as the highest level of evidence in research (Cooper et al. 2019).

Building on this foundation, the present meta-analysis seeks to enhance our understanding of the role personality plays in the experience of flow, thereby offering valuable implications for fostering optimal experiences in various domains, including education, work, and personal development. Furthermore, to gain a deeper understanding of the relationship between personality and flow, this study also aims to focus on the widely accepted dimensions of flow as previously presented. By analyzing these specific aspects, we aim to provide a more nuanced understanding of how personality traits influence various components of flow experience. In line with these objectives, this meta-analysis addresses five research questions (RQs):

RQ1. *Is there a relationship between each of the Big Five personality traits and flow experience?*

RQ2. *How do demographic factors (i.e., age, gender) and cultural differences impact the relationship between the Big Five personality traits and flow experience?*

RQ3. *Do the relationships between Big Five personality traits and flow experience vary across different contexts (i.e., education vs. workplace vs. sports vs. leisure vs. creative activities)*?

RQ4. *How does the relationship between the Big Five personality traits and flow experience differ across flow dimensions?*

RQ5. *How do the instruments used to measure personality and flow influence the relationship between the Big Five personality traits and flow experience*?

By addressing these questions, this meta-analysis will contribute to a comprehensive understanding of the interplay between personality traits and flow experience, offering valuable insights for both theoretical exploration and practical application in diverse fields.

2 | Method

2.1 | Search Strategy and Screening Process

The search was conducted in July 2024, using three databases: ProQuest, Scopus, and Web of Science, with the following search string: ("Personality" OR "Big Five" OR "Five Factor Model" OR "FFM" OR "Openness" OR "Conscientiousness" OR "Extraversion" OR "Agreeableness" OR "Neuroticism" OR "BFI" OR "Emotional Stability" OR "Negative Emotionality") AND ("Flow" OR "Optimal experience" OR "Autotelic experience"). A first selection of relevant papers was done based on title, abstract, and keywords, which needed to include terms related to both personality (i.e., Personality, Big Five, Five Factor Model, FFM, BFI, Openness, Conscientiousness, Extraversion, Agreeableness, Neuroticism, Emotional Stability, or Negative Emotionality) and flow (i.e., Flow, Flow Experience, Optimal Experience, or Csikszentmihalyi). The inclusion criteria for this meta-analysis were defined as follows: studies had to be published in either English and French, quantitatively examine the relationship between one or more of the Big Five personality traits and flow and/or its dimensions, and provide sufficient statistical information (i.e., correlation coefficients) necessary for effect size calculations. Additionally, only studies that were published as book chapters, articles, conference proceedings, or theses were considered for inclusion in the meta-analysis.

The titles and abstracts of the articles identified through the search strategy were examined, and any that did not meet the previously established inclusion criteria were excluded from further analysis. When the relevance was not clear from the title and abstract alone, the full text was reviewed. Subsequently, a backward search was conducted by examining the references cited in the relevant articles. For the articles that did not provide the necessary quantitative data sufficiently detailed to calculate effect sizes, the authors were contacted. Articles that did not provide any relevant statistics were excluded.

2.2 | Data Extraction

From the selected articles, details such as the type of publication (i.e., journal article, dissertation or book chapter) and publication year were recorded. Pearson and Spearman

correlations between the personality traits and flow were recorded. No other statistical estimates (e.g., *t*-tests or odds ratios) were used for effect size calculation. For eligible studies that did not report the necessary correlations, the corresponding authors were contacted. In several cases, the authors either provided the raw data or provided the relevant statistics, allowing these studies to be included in the meta-analysis. If neither of these options was feasible, the study was excluded from the meta-analysis due to insufficient statistical information.

The flow dimensions (cf., RQ4) were categorized according to the widely recognized conceptualization of flow (e.g., Abuhamdeh 2020) which includes concentration, action-awareness merging, loss of self-consciousness, sense of control, temporal distortion, intrinsically rewarding experience, perceived challenges, clear proximal goals, and immediate feedback.

In addition to flow dimensions (cf., RQ4), the moderator variables included the average age of the sample (cf., RQ2), the proportion of males (cf., RQ2), the culture (i.e., Eastern or Western; cf., RQ2) which was coded based on the country of the sample, the context of the study (e.g., education, leisure; cf., RQ3), the instrument used for assessing personality (cf., RQ5), and the instrument used for assessing flow (cf., RQ5). Sample size was also recorded for further analysis. The instruments used to assess personality and flow, as well as the study contexts, were recoded based on the frequency of effect sizes within each category. Categories with sparse representation were grouped under "other." For instance, personality and flow questionnaires with limited usage, such as the Big Five Questionnaire (Caprara et al. 1993) used exclusively in Bassi et al. (2014), and several self-designed, study-specific questionnaires (e.g., Ross and Macintyre 2020), were recoded as "other." Similarly, contexts with low representation, such as the mental activities context in Ross and Macintyre (2020) and the differentiation between internal and external tasks in Marty-Dugas and Smilek (2019), were also classified as "other." Additionally, when participants were drawn from both Eastern and Western cultures, the culture moderator variable was coded as missing to avoid conflating diverse cultural effects. This only affected this specific moderator analysis for culture and not the main analyses.

To ensure the accuracy of coding, 20% of the records were double-coded and perfect agreement (i.e., 100%) was found between both coders.

2.3 | Effect Size Calculation

In this meta-analysis, Pearson's correlation *r* was chosen as the effect size metric. For studies reporting only Spearman's correlation, the values were transformed to Pearson's *r* using the method outlined by Pearson (1907)[1]: $\text{Pearson's } r = 2 \times \sin\left(\frac{\text{Spearman } \rho \times \pi}{6}\right)$. Since Neuroticism and Emotional Stability are opposite traits, correlations for Emotional Stability were inverted to match the direction of Neuroticism[2]. Because the sampling distribution of correlations can strongly deviate from a normal distribution, we transformed Pearson's *r* to Fisher's *z* (Hedges and Olkin 1985). These Fisher's *z* values, weighted by inverse variances, were then combined into a weighted mean effect size using a random-effects model. To simplify interpretation, the results derived from Fisher's *z* were converted back to Pearson's *r*.

2.4 | Data Analysis

Given the hierarchical nature of our meta-analytic data (i.e., multiple correlation coefficients nested within studies), we employed a three-level random-effects model to account for the dependence of these coefficients (Becker 2000). This model allows for the quantification of variability in correlation coefficients both between and within studies, as well as sampling error variability (Van den Noortgate et al. 2013, 2015). By using this approach, we avoided the need to aggregate correlation coefficients within studies, enabling us to investigate variability and explore potential moderating effects at both the within-study and between-study levels (Rapp et al. 2014).

To evaluate within-study and between-study heterogeneity, we conducted a likelihood ratio test. Significant results from this test indicate substantial heterogeneity and suggest the presence of moderating effects. Where appropriate, post hoc multiple comparisons were carried out using the Bonferroni correction (Hothorn et al. 2008).

Finally, potential publication bias was examined through funnel-plot asymmetry and a three-level extension of Egger's regression intercept test, which accounts for dependency in correlation coefficients (Egger et al. 1997; Fernández-Castilla et al. 2021). The meta-analyses were conducted using the *metafor* package in R (Version 4.2–0; Viechtbauer 2010), and the post hoc pairwise comparisons were conducted using the *multcomp* package (Version 1.4-25; Hothorn et al. 2008).

2.5 | Transparency and Openness

We followed the MARS guidelines for reporting meta-analyses (Appelbaum et al. 2018). All meta-analytic data can be accessed via https://osf.io/ed725/files/osfstorage. The data were analyzed using R, version 4.2.2 (R Core Team 2022), with further details on the specific packages utilized provided in the data analysis section.

3 | Results

3.1 | Articles Included in the Meta-Analysis

A flowchart visualizing the search process is shown in Figure 1. The search for the ProQuest database yielded 1621 results using the specified search terms. The search in the Scopus database returned 3529 results. Finally, the search in the Web of Science database produced 2138 results. After removing duplicates from the combined results of the three databases, a total of 4554 articles were screened based on their titles and abstracts. In this step, many articles were excluded because they did not assess flow as defined earlier in this article. For example, many articles focused on water flow rather than the psychological state of flow.

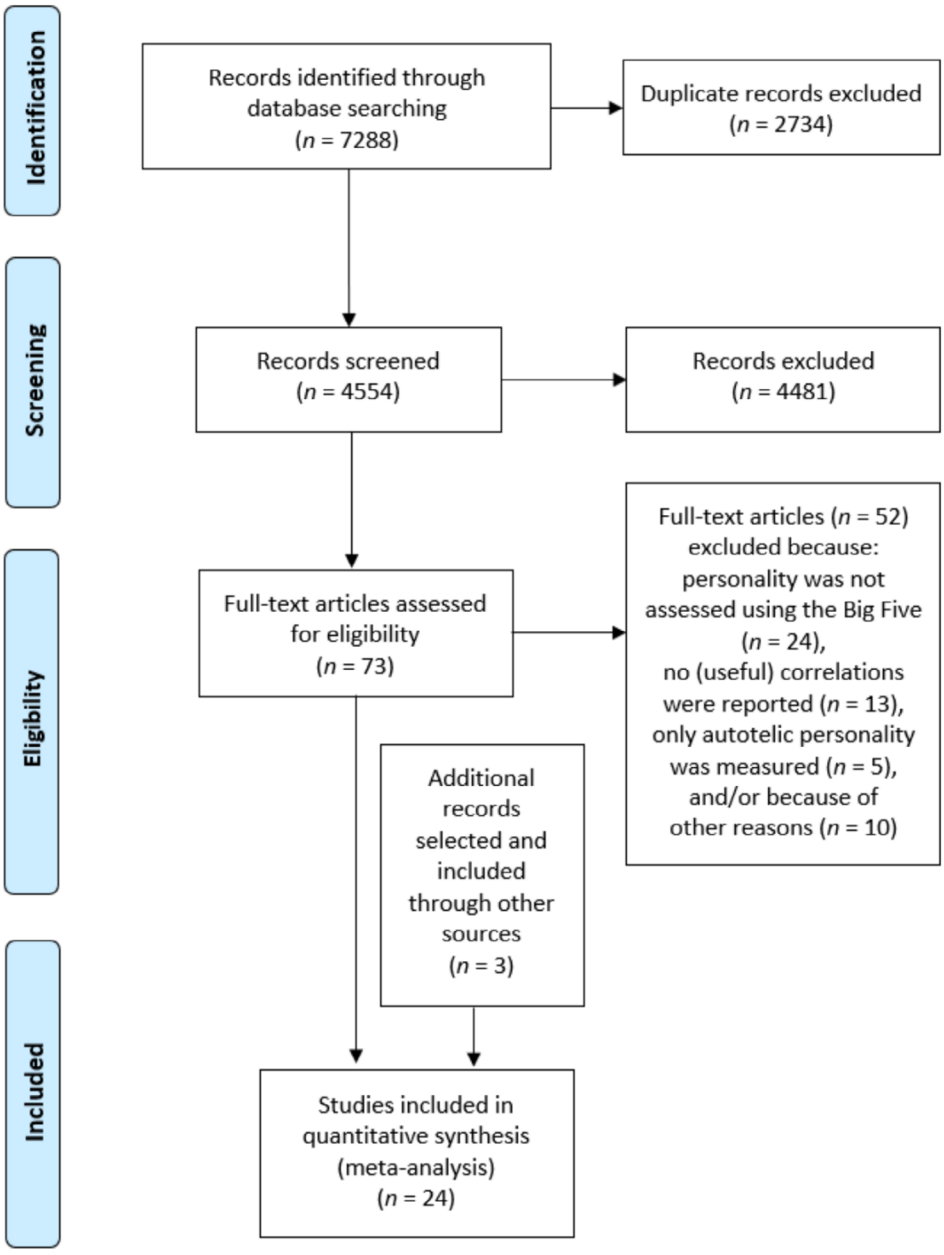

FIGURE 1 | Flowchart visualizing the literature search.

After the initial screening, the full texts of 73 articles were examined based on the inclusion criteria. Based on this screening, additional articles were excluded because they did not specifically assess the relationship between Big Five personality traits and flow experience or flow proneness. For example, one study by Dunkel et al. (2022) assessed personality in terms of the general factor of personality.

Out of these, 26 articles were identified as relevant for the current meta-analysis. A backward search conducted on these 26 articles yielded an additional three articles. However, several studies did not report the necessary statistics for this meta-analysis. To address this, we reached out to the corresponding authors of the specific studies to obtain the required data. Unfortunately, not all authors responded to these requests. Consequently, five studies that did not include any relevant correlations were excluded from the meta-analysis, resulting in a final selection of 24 studies yielding a total of 352 effect sizes, distributed as follows: Neuroticism and Emotional Stability ($n = 82$), Conscientiousness ($n = 80$), Extraversion ($n = 78$), Openness ($n = 43$), and Agreeableness ($n = 69$).

3.2 | Characteristics of the Included Studies

An overview and detailed information about the selected studies are provided in Table A1.

The studies included in this meta-analysis predominantly consisted of journal articles (95.83%), along with one conference proceeding (4.17%). The publication years spanned from 2006 to 2023, with sample sizes ranging significantly from 28 to 10,699 participants. The proportion of male participants varied from 20.50% to 71.00%. A majority of the studies were conducted in

TABLE 1 | Summarized overview of the results of the meta-analyses.

Outcome	Effect size (*r*)	SE	95% CI	*p*	σ^2_V	σ^2_U	σ^2_E
Neuroticism	−0.16	0.05	[−0.26, −0.06]	0.002	0.04	0.02	0.01
Conscientiousness	0.33	0.04	[0.24, 0.41]	< 0.001	0.02	0.02	0.01
Extraversion	0.25	0.04	[0.17, 0.33]	< 0.001	0.03	0.01	0.01
Openness	0.18	0.05	[0.09, 0.28]	< 0.001	0.03	0.01	0.002
Agreeableness	0.16	0.04	[0.08, 0.24]	< 0.001	0.02	0.002	0.01

Note: σ^2_V, between-study variance; σ^2_U, within-study variance; σ^2_E, typical sampling variance.
Abbreviations: CI, confidence interval; SE, standard error of the effect size.

Western cultures (70.83%) across countries such as Australia, Croatia, Germany, Poland, and the United States, while a smaller proportion originated from Eastern cultures (12.50%) in countries such as China and South Korea.

The studies also covered a broad range of contexts, with notable focuses on work (25.00%), education (29.17%), music (20.83%), and sports (16.67%), as well as other contexts such as leisure and household activities (25.00%). Four of these studies addressed multiple contexts.

Personality was predominantly measured using well-established instruments, including the NEO Personality Inventory (NEO-PI, 25.00%), the Big Five Inventory (BFI, 16.67%), and the International Personality Item Pool (IPIP, 20.83%), with several studies employing other or self-developed instruments (37.50%). Flow was assessed using a variety of instruments, the most common being the Dispositional Flow Scale (DFS, 29.17%) and the Swedish Flow Proneness Questionnaire (SFPQ, 12.50%), with the Flow State Scale (FSS) appearing in a smaller number of studies (4.16%). Other flow instruments were used in 62.50% of the studies. Two studies employed multiple scales to assess flow.

3.3 | Overall Analysis

Table 1 presents an overview of the meta-analysis results. Overall, Conscientiousness ($r = 0.33$), Extraversion ($r = 0.25$), Openness ($r = 0.18$), and Agreeableness ($r = 0.16$) all show significant positive associations with flow, while Neuroticism ($r = -0.16$) shows a significant negative association. The association with conscientiousness can be considered medium in size, the others as small[3].

3.4 | Heterogeneity Analysis

The likelihood ratio test revealed that the variance estimate was significant at the between-study level for the Neuroticism–flow link ($\chi^2 = 12.88$, df = 1, $p = 0.001$), the Conscientiousness–flow link ($\chi^2 = 35.66$, df = 1, $p < 0.001$), the Extraversion–flow link ($\chi^2 = 45.76$, df = 1, $p < 0.001$), the Openness–flow link ($\chi^2 = 19.80$, df = 1, $p < 0.001$), and the Agreeableness–flow link ($\chi^2 = 20.91$, df = 1, $p < 0.001$). At the within-study level, the variance estimate was significant for the Neuroticism–flow link ($\chi^2 = 38.85$, df = 1, $p < 0.001$), the Conscientiousness–flow link ($\chi^2 = 34.24$, df = 1, $p < 0.001$), the Extraversion–flow link ($\chi^2 = 5.30$, df = 1, $p = 0.02$), and the Openness–flow link ($\chi^2 = 148.35$, df = 1, $p < 0.001$), but not for the Agreeableness–flow link ($\chi^2 = 0.58$, df = 1, $p = 0.45$).

3.5 | Publication Bias

Figure 2 displays the funnel plots for the five meta-analyses. Visual inspection of these plots indicates that the effect sizes are distributed roughly symmetrically around their means. The Egger's test results confirms a lack of evidence for publication bias for the Conscientiousness–flow link ($t = -1.75$, df = 78, $p = 0.08$), the Openness–flow link ($t = -1.89$, df = 41, $p = 0.07$), and the Agreeableness–flow link ($t = -1.73$, df = 67, $p = 0.09$), but not for the Neuroticism–flow link ($t = -3.85$, df = 80, $p < 0.001$) and the Extraversion–flow link ($t = -4.20$, df = 76, $p < 0.001$).

3.6 | Moderator Analysis

An overview of the results of the moderator analyses for each of the personality dimensions is provided in Table 2. The following sections offer a detailed examination of the moderator analyses for the five personality dimensions.

3.6.1 | Results of RQ2

For RQ2, significant moderating effects of culture were found for Extraversion, Openness, and Agreeableness, with stronger correlations observed in Eastern cultures compared to Western cultures. For Neuroticism and Conscientiousness, there were no significant moderating effects of culture. In addition, no significant moderating effects of gender or age were found for the relationship between personality traits and flow.

3.6.2 | Results of RQ3

For RQ3, which examined whether the relationships between the personality traits and flow vary across Different contexts, no significant differences were found across these contexts.

3.6.3 | Results of RQ4

For RQ4, a significant moderating effect was observed in the Neuroticism-flow link depending on the flow dimension. However, post hoc analyses revealed no significant pairwise

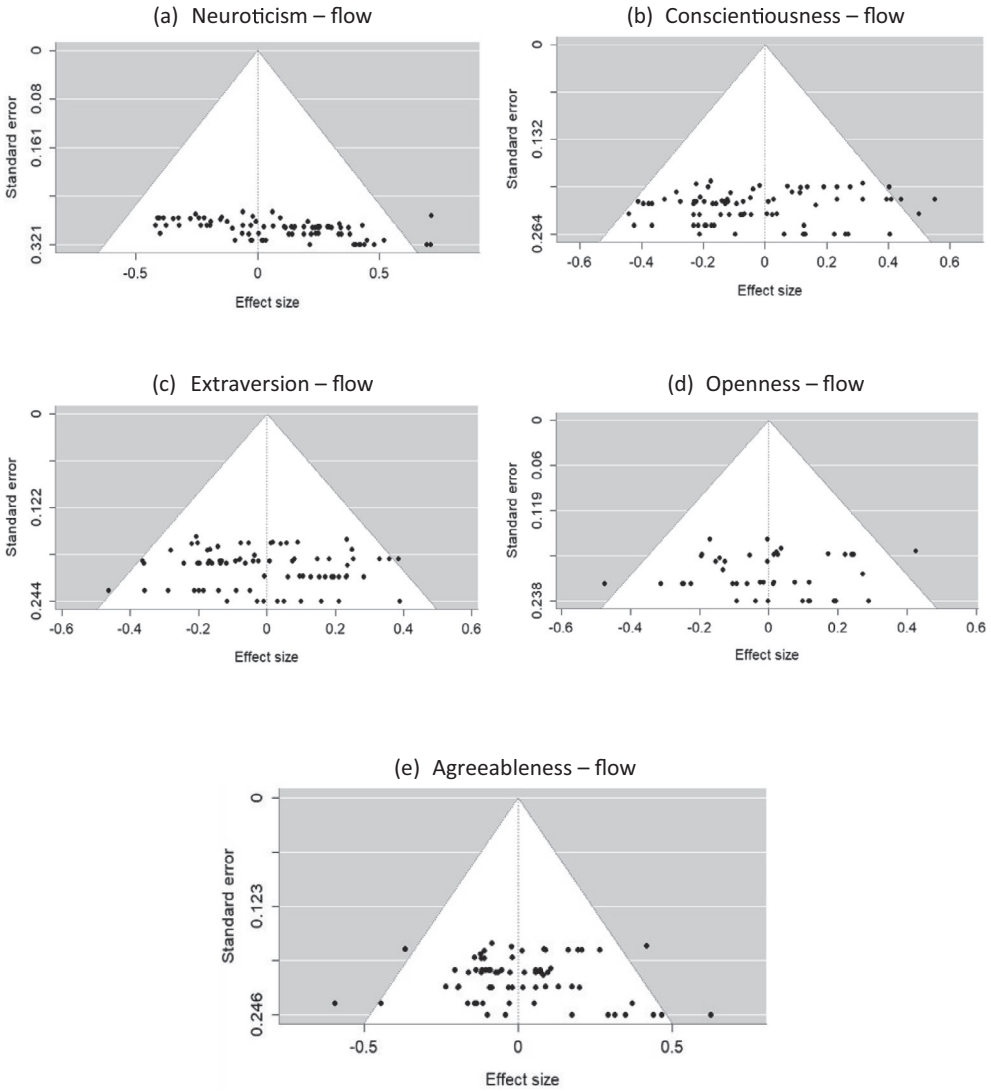

FIGURE 2 | Overview of the funnel plots for each of the personality-flow relationships: (a) Neutoricism – flow; (b) Conscientiousness – flow; (c) Extraversion – flow; (d) Openness – flow; (e) Agreeableness – flow.

differences. No significant moderation effects were observed for the remaining personality-flow links, including those for Conscientiousness, Extraversion, Openness, and Agreeableness across flow dimensions.

3.6.4 | Results of RQ5

For RQ5, the relationship between the personality traits and flow experience differed by the flow scale used. Specifically, the Neuroticism-flow link significantly varied by flow scale. The correlation was nonsignificant for the FSS, SFPQ, and other scales and significant for the DFS. The correlation for the DFS was significantly more negative than for the scales grouped under the "other" category (e.g., Dimensions of Flow Scale and Flow Questionnaire) (Bonferroni $p = 0.03$), and not significantly different from the FSS or the SFPQ.

The Openness-flow link varied by flow scale, with nonsignificant correlations found for the FSS and SFPQ scales, while significant correlations were found for the DFS and other scales. The post hoc analysis showed that only the correlation for the "other" scales was significantly larger compared to the SFPQ (Bonferroni $p = 0.002$), while all other comparisons remained nonsignificant.

Similarly, the Agreeableness-flow link varied by flow scale. The correlation was nonsignificant for the FSS and DFS scales, while significant for the SFPQ and other scales. Only the correlation for the SFPQ was significantly larger compared to the DFS (Bonferroni $p = 0.01$), with no significant differences observed for the other comparisons.

No significant moderation effects related to flow scales were observed for the remaining personality-flow links, including Conscientiousness and Extraversion.

4 | Discussion

This meta-analysis, the first of its kind to explore the personality-flow link, aimed to clarify the relationship

TABLE 2 | Results of moderator analyses.

Moderator variable	Neuroticism						Conscientiousness						Extraversion					
	k	*r*	[95% CI]	*F*	df	*p*	*k*	*r*	[95% CI]	*F*	df	*p*	*k*	*r*	[95% CI]	*F*	df	*p*
Culture				1.81	1, 72	0.18				3.34	1, 70	0.07				5.95	1, 68	**0.02**
Eastern	3	0.06	[−0.25, 0.35]				3	0.51	[0.27, 0.75]				3	0.49	[0.29, 0.70]			
Western	71	−0.17	[−0.29, −0.04]				69	0.28	[0.18, 0.37]				67	0.22	[0.13, 0.32]			
Gender	68			0.39	1, 66	0.54	66			0.03	1, 64	0.87	64			0.14	1, 62	0.70
Age	72			0.75	1, 70	0.39	70			0.30	1, 68	0.58	68			0.48	1, 66	0.49
Context				1.47	4, 77	0.22				0.40	4, 75	0.81				1.95	4, 73	0.11
Education	11	−0.15	[−0.32, 0.04]				11	0.39	[0.23, 0.55]				11	0.35	[0.22, 0.48]			
Work	4	−0.20	[−0.39, 0.01]				6	0.35	[0.18, 0.51]				4	0.34	[0.20, 0.48]			
Sport	29	−0.07	[−0.23, 0.10]				27	0.26	[0.10, 0.41]				27	0.18	[0.05, 0.31]			
Music	4	0.18	[−0.41, 0.08]				3	0.30	[0.05, 0.56]				4	0.13	[−0.04, 0.30]			
Others	34	−0.23	[−0.37, −0.08]				33	0.29	[0.15, 0.43]				32	0.20	[0.08, 0.32]			
Flow dimension				2.12	9, 72	**0.04**				1.45	9, 70	0.18				0.13	9, 68	0.99
Awareness	6	−0.07	[−0.29, 0.16]				6	0.22	[0.02, 0.43]				6	0.22	[0.03, 0.40]			
Goals	6	−0.26	[−0.46, −0.03]				6	0.31	[0.11, 0.52]				6	0.26	[0.08, 0.45]			
Concentration	8	−0.22	[−0.39, −0.04]				8	0.37	[0.21, 0.53]				8	0.24	[0.10, 0.38]			
Feedback	6	−0.28	[−0.49, −0.06]				6	0.28	[0.08, 0.48]				6	0.22	[0.03, 0.40]			
Rewarding	6	−0.29	[−0.48, −0.07]				6	0.39	[0.19, 0.59]				6	0.26	[0.08, 0.45]			
Consciousness	6	−0.15	[−0.36, 0.08]				6	0.14	[−0.06, 34]				6	0.24	[0.05, 0.42]			
Challenges	6	−0.23	[−0.44, −0.01]				6	0.37	[0.16, 57]				6	0.26	[0.07, 0.44]			
Control	6	−0.30	[−0.49, −0.08]				6	0.31	[0.11, 52]				6	0.23	[0.04, 0.41]			
Distortion	6	0.01	[−0.22, 0.24]				6	0.14	[−0.05, 0.35]				6	0.19	[0.01, 0.38]			
Overall	26	−0.15	[−0.26, −0.03]				24	0.34	[0.25, 0.44]				22	0.26	[0.16, 0.35]			

(Continues)

TABLE 2 | (Continued)

Moderator variable	Neuroticism						Conscientiousness						Extraversion					
	k	*r*	[95% CI]	*F*	df	*p*	*k*	*r*	[95% CI]	*F*	df	*p*	*k*	*r*	[95% CI]	*F*	df	*p*
Flow scale				2.73	3, 78	**0.04**				2.34	3, 76	0.08				0.36	3, 74	0.78
DFS	15	−0.33	[−0.48, −0.17]				15	0.44	[0.30, 0.58]				15	0.31	[0.16, 0.45]			
FSS	9	−0.16	[−0.50, 0.22]				9	0.15	[−0.15, 0.45]				9	0.27	[−.08, 0.62]			
SFPQ	6	−0.19	[−0.38, 0.01]				5	0.42	[0.24, 0.61]				5	0.20	[0.04, 0.36]			
Others	52	−0.07	[−0.19, 0.05]				51	0.27	[0.17, 0.37]				49	0.23	[0.12, 0.34]			
Big five scale				1.30	3, 78	0.28				0.31	3, 76	0.82				0.25	3, 74	0.86
BFI	9	−0.27	[−0.49, −0.02]				8	0.42	[0.20, 0.64]				8	0.26	[0.05, 0.48]			
IPIP	37	−0.25	[−0.52, −0.01]				39	0.29	[0.12, 0.47]				37	0.18	[−.03, 0.39]			
NEO-PI	27	−0.21	[−0.38, −0.02]				25	0.30	[0.13, 0.48]				25	0.24	[0.06, 0.41]			
Others	9	−0.04	[−0.20, 0.13]				8	0.33	[0.18, 0.48]				8	0.29	[0.15, 0.43]			

Moderator variable	Openness						Agreeableness					
	k	*r*	[95% CI]	*F*	df	*p*	*k*	*r*	[95% CI]	*F*	df	*p*
Culture				19.56	1, 33	**<0.001**				9.76	1, 59	**0.003**
Eastern	3	0.50	[0.33, 0.67]				3	0.40	[0.23, 0.56]			
Western	32	0.09	[0.01, 0.18]				58	0.10	[0.02, 0.18]			
Gender	27			0.92	1, 25	0.35	55			0.38	1, 53	0.54
Age	33			0.02	1, 31	0.88	59			0.15	1, 57	0.70
Context				0.94	4, 38	0.45				1.37	4, 64	0.26
Education	11	0.23	[0.08, 0.38]				11	0.22	[0.08, 0.35]			
Work	4	0.25	[0.08, 0.43]				4	0.18	[0.04, 0.31]			
Sport	18	−0.03	[−0.29, 0.23]				27	0.18	[0.04, 0.33]			
Music	4	0.18	[−0.04, 0.41]				3	0.08	[−0.14, 0.30]			
Others	6	0.18	[−0.01, 0.37]				24	0.10	[−0.03, 0.23]			

(Continues)

TABLE 2 | (Continued)

	Openness						Agreeableness					
Moderator variable	***k***	***r***	**[95% CI]**	***F***	**df**	***p***	***k***	***r***	**[95% CI]**	***F***	**df**	***p***
Flow dimension				0.95	9, 33	0.50				0.21	9, 59	0.99
Awareness	2	0.26	[−0.07, 0.59]				5	0.15	[−0.05, 0.35]			
Goals	2	−0.02	[−0.35, 0.31]				5	0.13	[−0.07, 0.33]			
Concentration	4	0.26	[0.08, 0.43]				7	0.12	[−0.02, 0.26]			
Feedback	2	−0.04	[−0.37, 0.29]				5	0.07	[−0.13, 0.26]			
Rewarding	2	0.04	[−0.29, 0.37]				5	0.14	[−0.06, 0.33]			
Consciousness	2	0.24	[−0.09, 0.57]				5	0.10	[−0.10, 0.30]			
Challenges	2	0.29	[−0.04, 0.62]				5	0.11	[−0.08, 0.31]			
Control	2	0.10	[−0.23, 0.43]				5	0.11	[−0.09, 0.30]			
Distortion	2	0.18	[−0.15, 0.51]				5	0.10	[−0.10, 0.29]			
Overall	23	0.19	[0.09, 0.28]				22	0.17	[0.09, 0.26]			
Flow scale				5.84	3, 39	**0.002**				3.22	3, 65	**0.03**
DFS	6	0.15	[0.01, 0.30]				6	0.02	[−0.12, 0.15]			
FSS	9	−0.12	[−0.46, 0.21]				9	0.07	[−0.25, 0.40]			
SFPQ	5	0.11	[−0.01, 0.24]				5	0.29	[0.17, 0.41]			
Others	23	0.26	[0.16, 0.37]				49	0.21	[0.12, 0.31]			
Big five scale				1.55	2, 40	0.22				0.82	3, 65	0.49
BFI	10	0.17	[−0.01, 0.35]				8	0.24	[0.04, 0.43]			
IPIP	/	/	/				28	0.06	[−0.18, 0.30]			
NEO-PI	25	0.07	[−0.09, 0.24]				25	0.09	[−0.06, 0.25]			
Others	8	0.26	[0.12, 0.40]				8	0.20	[0.08, 0.32]			

Note: k, number of effect sizes. The slash (/) indicates missing data. Significant *p*-values are highlighted in bold for clarity.

between the Big Five personality traits and flow experience. For RQ1, the findings suggest that Conscientiousness, Extraversion, Openness, and Agreeableness all show positive associations with flow, though the strength of these relationships varies. Specifically, the correlations for Extraversion ($r = 0.25$), Openness ($r = 0.18$), and Agreeableness ($r = 0.16$) are small, while the correlation for Conscientiousness ($r = 0.33$) is of medium strength, considering Cohen's (1988) guidelines. The characteristics of Conscientious individuals (e.g., Kern 2020) are essential for maintaining focus, managing challenges, and regulating efforts toward meaningful tasks, aligning more closely with various dimensions of flow such as concentration and sense of control. In addition, the study revealed a negative correlation with Neuroticism ($r = -0.16$), which is considered small. This result can be attributed to the inherent characteristics of Neuroticism, which are in opposition to some dimensions of flow such as the feeling of intrinsic reward or concentration, since individuals high in Neuroticism are prone to experiencing negative emotions, such as anxiety, sadness, and worry, as well as difficulties with stress management and emotional regulation (Zhang 2020).

Although the correlations observed in this study account for only a modest proportion of variance, such effect sizes are often considered typical in the context of personality and individual differences research, where Cohen's (1988) benchmarks may in fact be considered too conservative. As Gignac and Szodorai (2016) argue, correlations of 0.10, 0.20, and 0.30 should be interpreted as relatively small, typical, and relatively large, respectively. From this perspective, the correlation for Conscientiousness can be considered relatively large, while those for Extraversion, Openness, Agreeableness, and Neuroticism fall within the typical range of effect sizes commonly observed in this domain. These findings suggest that even modest correlations can be substantively meaningful when situated within the broader context of individual differences research.

Additionally, this meta-analysis aimed to clarify inconsistencies among previous findings by examining various potential moderating effects. Regarding RQ2, the relationship between the personality domains Extraversion, Openness, and Agreeableness and flow were found to be notably stronger in Eastern cultures compared to Western cultures. Eastern cultures tend to emphasize collectivistic values (Hofstede et al. 2010), such as group harmony, interpersonal relationships, and shared goals (Triandis 2001). These cultural characteristics may enhance the situational relevance of personality traits like Agreeableness and Extraversion for fostering flow experiences. This also aligns with the trait activation theory, which posits that personality traits are more likely to manifest in situations that provide relevant cues for their expression (Tett and Guterman 2000). However, other factors may also account for the observed moderation effect. For instance, studies conducted in Eastern cultures in this meta-analysis typically relied on different flow instruments than those used in Western samples. In addition, the number of studies from Eastern contexts was relatively small, limiting the robustness and generalizability of the findings. Therefore, future research should aim to further study this moderation effect.

Gender and age did not emerge as a significant moderator for the relationship between personality and flow, indicating that the influence of personality on flow experiences is overall consistent across male and female participants and across ages.

Regarding RQ3, no significant differences were observed between the contexts of education, work, sports, music, and other, in the relationship between the Big Five personality traits and flow experience. This suggests that the personality-flow relationship remains consistent across these diverse environments. The absence of a moderating effect of context in the current meta-analysis may initially seem surprising, especially in light of trait activation theory (Tett and Guterman 2000). One possible explanation is that the contextual categories used in this meta-analysis (e.g., education, work, sports) were too broad to detect nuanced interaction effects. For instance, education may span from passive lecture-based settings to active or collaborative learning. Such specific task characteristics may be more influential for trait activation.

Looking at the moderating effect of flow dimensions (cf. RQ4), a significant overall moderating effect was found for the Neuroticism–flow relationship. This suggests that the strength of the association between Neuroticism and flow may vary depending on the specific flow dimension. However, no significant differences were observed between individual dimensions in the post hoc comparisons. This may indicate that differences are subtle, or that the number of studies per dimension limited statistical power.

As for the moderating effect of instruments used for assessing personality and flow (i.e., RQ5), no significant moderating effect was found for the Big Five scale. However, for the flow scale, a significant moderating effect was identified. Specifically, the Neuroticism–flow correlation was significantly more negative when flow was measured using the DFS compared to other scales. For the Openness-flow link, it was found that the correlations for the SFPQ were significantly smaller compared to other scales that were not considered individually in this study (e.g., State Flow Scale). For the Agreeableness-flow link, the correlation between the SFPQ was significantly larger than the DFS. A possible explanation is that other scales, like the WOLF, may assess flow in more contextually or situationally relevant ways, better aligning with traits like Openness. These findings emphasize that the choice of flow measurement instrument can meaningfully affect the observed strength of associations with personality traits. The variability in observed correlations across flow scales raises broader concerns about the conceptual consistency of flow measurement across studies.

4.1 | Strengths and Limitations

This meta-analysis has several strengths that contribute to its robustness and reliability. It employed a comprehensive search strategy across multiple databases, ensuring a broad and inclusive coverage of relevant literature (DeSimone et al. 2021; Martín-Martín et al. 2021; Mongeon and Paul-Hus 2016), with an additional backward search.

Additionally, the analyses employed advanced statistical techniques, such as the three-level random-effects model, which enabled a more nuanced examination of variability within and between studies. The inclusion of various moderators provided a deeper understanding of the personality-flow relationship. However, it is important to acknowledge that the number of effect sizes in some moderator analyses was relatively small, despite careful consideration in the study design. Specifically, the number of effects sizes were rather low for Eastern cultures and for the flow dimensions. This reduces the statistical power and may constrain the generalizability of the findings and needs to be considered for future research endeavors. For instance, future research could explore additional regional differences, as well as examine diverse contexts beyond those typically studied and included in this study.

To ensure the robustness of the results, the study included a sensitivity analysis and publication bias evaluation. While most personality traits did not exhibit significant publication bias, the analysis revealed a notable bias in the relationship between Extraversion and Flow. Therefore, the Extraversion–Flow link needs to be interpreted with caution.

Furthermore, it is important to note that studies included in this meta-analysis relied on self-reported measures for both personality traits and flow experiences, often without incorporating time intervals between these assessments. This lack of temporal separation may raise concerns about potential common method bias, where the same respondent provides data for both variables within the same timeframe, potentially inflating the observed relationships. There was also a substantial heterogeneity in the flow measurement instruments used across studies. In fact, 62.5% of studies relied on flow instruments that were not among the most commonly used scales. Such variation may have introduced heterogeneity in effect sizes, even beyond the moderation analyses conducted. Future research would benefit from more standardized and validated flow measurement practices.

4.2 | Implications and Future Research

Overall, the findings of this meta-analysis underscore the importance of considering personality in analyses when examining subjects' flow experiences. For instance, in experimental research studying flow experience between multiple conditions, controlling for personality traits is important, as individual differences could introduce variability that may obscure the true effects of experimental conditions on flow.

While this meta-analysis highlights cultural differences in the personality-flow relationship, further research is needed to explore these dynamics in underrepresented regions. Cross-cultural studies with larger and more diverse samples can provide a deeper understanding of how cultural values and social norms shape flow experiences. Furthermore, the relatively small number of effect sizes for some moderators in this analysis suggest that future research should focus on expanding these areas. Importantly, rather than relying solely on broad contextual categories such as education, work, or sports, future research would benefit from focusing on more specific contextual features such as task complexity or social interdependence. Similarly, exploring less-studied moderators such as specific flow dimensions, gender differences, and context-specific factors with larger sample sizes could yield more generalizable findings.

The sole reliance on self-reported data in many studies calls for the incorporation and further exploration of additional methods to measure flow (e.g., Buseyne et al. 2025; Oliveira et al. 2021; Wolf et al. 2015). Using multimodal measures, such as behavioral indicators, physiological data, and eye-tracking data, could further enhance our understanding of the interplay between personality and flow (Peifer et al. 2022).

Moreover, researchers can build on the findings of this study to develop and test interventions aimed at enhancing individuals' flow experiences across various settings. For instance, in workplace environments, interventions could be designed to foster flow by accounting for individual personality traits. Specifically, in line with related research on wellbeing by Evans et al. (2021), there is a dual opportunity: (a) personalizing strategies to foster flow experience by providing support and resources tailored to differences in personality and (b) helping individuals better understand how their personality affects their experience of flow. Another example is the educational setting, where Tian and Ou (2023) suggest it is valuable to consider how to enhance the depth and frequency of students' flow experiences in learning by accounting for their personality traits.

To enhance the interpretation and applicability of research on the relationship between personality and flow, it would be valuable to conduct studies that examine this relationship at the trait level of personality. Personality traits may have varying, or even opposing, effects, as suggested by Steel et al. (2008) in their meta-analysis on personality and subjective well-being. Despite the potential insights this approach could offer, we could not identify research directly exploring the link between specific personality traits and flow, highlighting an opportunity for future research.

5 | Conclusion

This meta-analysis synthesizes the associations between the Big Five personality traits and flow, suggesting that Conscientiousness, Extraversion, Openness, and Agreeableness are positively associated with flow, while Neuroticism is negatively associated. Among these traits, Conscientiousness showed the strongest link, with the others showing smaller yet meaningful associations. The findings support the view that flow is not a fixed psychological state but one shaped by both individual and contextual characteristics. This study thus contributes to a more nuanced understanding of flow and provides a foundation for future research on how personality and contextual characteristics jointly influence the experience of flow.

Author Contributions

Siem Buseyne: conceptualization, methodology, formal analysis, investigation, writing – original draft, writing – review and editing, project administration. **Sameh Said-Metwaly:** conceptualization, methodology, validation, formal analysis, investigation, writing – original draft,

writing – review and editing, visualization. **Wim Van den Noortgate:** methodology, writing – review and editing. **Fien Depaepe:** writing – review and editing, supervision. **Annelies Raes:** writing – review and editing, supervision.

Ethics Statement

This research was not preregistered in an independent, institutional registry and did not require ethical examination.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data and code supporting our findings are made available in a repository (https://osf.io/ed725/files/osfstorage).

Endnotes

[1] A sensitivity analysis was conducted comparing the results with and without Spearman's correlation coefficients, and the results did not change significantly.

[2] A sensitivity analysis was conducted comparing results with and without the inclusion of the inverted scores for Emotional Stability. The overall pattern of results did not change significantly.

[3] A sensitivity analyses was conducted by excluding two studies with large sample sizes (Coleman et al. 2018; Butkovic et al. 2015) one at a time, and the results remained significantly unchanged, indicating that the estimates are fairly robust.

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Supporting Information

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