AMERICAN PSYCHOLOGICAL ASSOCIATION

Emotion


ISSN: 1528-3542

https://doi.org/10.1037/emo0001657

# Just Keep Flowing: A Meta-Analysis on the Relationship Between Flow and Well-Being

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Flow is the experience of being deeply immersed in an activity, an experience that researchers have embraced as a predictor of well-being. Although research on the beneficial effects of flow is widespread, its multidisciplinary nature has precluded a clear consensus on their nature and strength. Results from a meta-analysis revealed a moderately strong, positive relationship between flow and well-being, consistent with our hypothesis. Features of the well-being measure moderated the association, such that eudaimonic measures showed a stronger association than did hedonic measures, and among hedonic measures, measures of cognitive well-being were more strongly associated with flow than affective measures. Measures of positive aspects of well-being were also more strongly associated with flow than measures of negative aspects. The association was surprisingly robust to features of the flow measure and activity, the design of the study, and characteristics of the sample. These findings suggest that flow in all its forms may be positively associated with well-being, though not all forms of well-being equally.

*Keywords:* flow, well-being, meta-analysis



Flow is a multidimensional concept that describes the experience of being deeply immersed in an activity, commonly referred to as being "in the zone." Since its introduction to academic discourse in 1975, researchers have embraced flow as a powerful experience and a predictor of quality of life and personal growth (Nakamura & Csikszentmihalyi, 2009). Indeed, flow research became so popular that researchers have examined its role in well-being[1] in a variety of contexts, including the workplace (e.g., Eisenberger et al., 2005), education and learning (e.g., Bassi & Delle Fave, 2012), gaming (e.g., Hull et al., 2013; cf. Zimanyi & Schüler, 2021), and sports and music (e.g., Fritz & Avsec, 2007; Martinez & Scott, 2016), among others. Though research on the relationship between flow and well-being is now widespread, the multidisciplinary nature of the work has precluded a clear consensus on the nature and strength of the relationship. To our knowledge, two meta-analyses have synthesized research on flow: one addressing skill–challenge balance and other antecedents of flow (Fong et al., 2015) and one addressing the association between flow and performance (Harris et al., 2023). Thus, we conducted a comprehensive meta-analysis of the association between flow and well-being, with the aim of synthesizing the large body of literature on the topic and clarifying the affective underpinnings of flow's potential benefits for well-being.

## What Is Flow?

Almost 50 years ago, Mihaly Csikszentmihalyi first introduced the idea of "flow" into academic discourse as an "optimal experience" (Csikszentmihalyi, 1975). Despite ongoing debate regarding best practices for measuring flow (Moneta, 2021), most researchers agree on its definition: a state of mind that arises when a person becomes fully immersed in an activity (Csikszentmihalyi, 1975, 2000). When Csikszentmihalyi (1975) first investigated flow as an optimal experience, he identified six components of flow that emerged from interviews with people engaged in various creative endeavors (e.g., painters, musicians). The field has retained the multidimensional nature of flow in its most accepted conceptualization (Engeser et al., 2021). However, later empirical efforts revealed additional components and thus a more comprehensive picture of the flow experience. Current definitions of flow typically include nine elements (Engeser et al., 2021): concentration on the task at hand, a sense of control, balance between challenge and skill, merging of action and awareness, loss of self-consciousness, time distortion, clear goals, unambiguous feedback, and autotelic experience. That said, few studies have examined these components individually,[2] and even fewer have comprehensively tested the causal power of individual

William Tov served as action editor.

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The additional online material is available on the Open Science Framework at https://osf.io/r7dg4/. The authors thank Kyla Rankin for her early assistance with this project.

Kate Sweeny played a lead role in project administration, supervision, and writing–review and editing and an equal role in data curation, methodology, and writing–original draft. Janine Medina Huerta played a lead role in formal analysis and writing–original draft, a supporting role in writing–review and editing, and an equal role in conceptualization, data curation, and methodology. Jason Hawes played an equal role in formal analysis and software. Sophia Susoeff played an equal role in data curation.

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[1] Here and throughout the article, we define well-being broadly as any construct that captures positive or negative psychological experiences, rather than narrowly focusing on the construct of subjective well-being (i.e., positive and negative affect plus satisfaction with life).

[2] We identified 16 studies that met our inclusion criteria and included analyses with individual flow components.

components. Thus, we focus on holistic assessments of flow for the purpose of this investigation.

## Flow and Well-Being

In its nascent days, research on flow took a phenomenological approach (Asakawa, 2010); in other words, the primary goal was to uncover the mechanisms underlying flow and the factors that promote it. However, it was swiftly apparent that flow had the potential to improve quality of life, promote personal growth, and even serve as the foundation of "a good life" (Nakamura & Csikszentmihalyi, 2009). In the late 1990s and early 2000s, interest in the study of well-being went through a renaissance. Given flow's potential for beneficial outcomes, it is not surprising that flow research was particularly prominent in the then-emerging area of positive psychology (e.g., Snyder & Lopez, 2009). Indeed, Csikszentmihalyi (1990) himself argued that happiness would naturally arise after experiencing flow, his reasoning being that flow fosters personal development, which in turn would lead to positive affect immediately following a flow experience and in the long term.

Two recent scoping reviews (Norsworthy et al., 2021; Peifer et al., 2022) assessed the current evidence for links between flow and various types of well-being. Peifer et al. (2022) concluded that although numerous studies have found evidence that flow is beneficial for well-being, broadly defined (conceptualized as "emotion" in their review), most studies have focused exclusively on positive affect and other positive markers of well-being. Norsworthy et al. (2021) focused less on well-being outcomes but broadly concluded that such outcomes are the most commonly studied in terms of consequences of flow. Thus, the time is right to deliver a quantitative analysis of the strength and moderators of flow's association with well-being.

## Potential Moderators of the Relationship Between Flow and Well-Being

The popularity of flow research, including research that focuses on well-being, has been both a strength and a weakness. On the one hand, it contributes knowledge to the many fields interested in flow, drawn from a broad array of methodologies, samples, contexts, and measures. On the other hand, the variety of approaches across disciplines, paired with the complexity of the construct, hinders researchers' ability to make definitive claims regarding flow and its consequences for well-being. The aim of this meta-analysis is to provide a much-needed first step toward reaching a consensus regarding the association between flow and well-being. In addition to examining the overall relationship between the two constructs, we also explored potential moderators in five categories: measurement/conceptualization of well-being, measurement of flow, nature of the flow activity, study design, and sample characteristics.

### *Type of Well-Being*

As mentioned earlier, flow's potential for beneficial outcomes made it a popular area of study in positive psychology (e.g., Snyder & Lopez, 2009). Thus, studies examining the consequences of flow on well-being include a wide variety of well-being measures. Some researchers have explored the ways in which flow bolsters positive aspects of well-being such as positive affect (e.g., Schüler et al., 2013) and satisfaction with life (e.g., Sherman et al., 2016); others have examined the ways in which flow can mitigate negative aspects of well-being such as anxiety and depressive symptoms (e.g., Mosing et al., 2018; Sweeny, Rankin, Cheng, et al., 2020). The majority of studies included in our meta-analysis report flow's relationship with both positive and negative aspects of well-being, providing an ideal opportunity to test the moderating effect of type of well-being.

We approach well-being through a number of lenses in our analysis. First, we grouped well-being measures into as many "types" as necessary to capture the range of measures in the relevant literature and explored variation among their effect sizes. As explicated in the Method section, the range in measures is quite broad (14 categories in all), as is the range of studies that included each measure (from a single study of loneliness to 46 studies that included at least one measure of emotion).

Second, we grouped well-being measures into measures that targeted positive aspects of well-being (e.g., happiness, positive emotion, flourishing) and negative aspects of well-being (e.g., anxiety, negative emotion, burnout), with a third category for measures that combined positive and negative aspects. We recognize that these groupings are quite crude, given that many of the measures use bipolar scales (e.g., very unhappy–very happy) that render those measures more bipolar than positive or negative. Nonetheless, we include a test of valence as a moderator, given that studies including positive aspects of well-being may have different aims than studies that include negative aspects of well-being—testing elements of flourishing, broadly defined, rather than mitigation of ill-being—and given that one of the recent scoping reviews specifically called out a bias in the flow literature toward positive markers of well-being.

Third, we grouped the measures into eudaimonic versus hedonic measures of well-being. Although this distinction dates back to ancient Greek philosophers, modern psychology embraced the duality in the early 2000s (for an early review, see Ryan & Deci, 2001; see also Tov, 2018). In brief, hedonic well-being reflects a life characterized by many good feelings and relatively few bad feelings, as well as an overall assessment that one's life is satisfactory (also referred to as subjective well-being; e.g., Diener, 1984). The key characteristic of hedonic well-being is that the source of emotional positivity and life satisfaction is not pertinent to the definition; simply feeling good and satisfied "counts" as well-being in the hedonic view. In contrast, eudaimonic well-being centers around values of personal growth, human potential, and effective functioning. Put simply, eudaimonic well-being is "more than just happiness" (Ryan & Deci, 2001, p. 143). Typical measures of eudaimonic well-being capture purpose and meaning and the fulfillment of basic psychological needs for autonomy, competence, and connection (e.g., Ryan & Deci, 2000; Ryff, 1989).

Finally, focusing specifically on studies that included hedonic measures of well-being, we grouped those measures into cognitive versus affective types. As just noted, hedonic well-being consists of an affective or emotional component, typically assessed as the frequency or intensity of positive and negative emotions, and the cognitive assessment of how well one's life is going, all things considered.

We did not have a priori hypotheses about how the specific type of well-being measured or whether hedonic measures are cognitive (namely satisfaction with life) or affective (e.g., emotion, happiness, anxiety, vitality) in nature would moderate the association between well-being and flow. However, based on the assumption that flow is

inherently enjoyable (Abuhamdeh, 2021), paired with the relative absence of theoretical or empirical support for flow as a buffer to ill-being (e.g., Peifer et al., 2022), we hypothesize that flow is more beneficial for bolstering positive aspects of well-being than for buffering against negative aspects of well-being. We further hypothesized that flow would be more strongly associated with eudaimonic measures of well-being (meaning, need fulfillment, and Ryff's measure of psychological well-being) than with hedonic measures (emotion, satisfaction with life, happiness, worry, anxiety, depression, burnout, loneliness, spiritual well-being, and vitality; flourishing was not included in this analysis because it includes elements of both types). Although we know of no research directly addressing that question, flow is sometimes considered to be an aspect of eudaimonic well-being (e.g., Bonaiuto et al., 2016), and various authors have highlighted the role of flow in promoting personal growth, deep mastery, and optimal experience (Csikszentmihalyi & LeFevre, 1989; Moneta & Csikszentmihalyi, 1996).

We also explored the timeframe of the well-being measures included in our analysis, ranging from how people feel "right now" to general, dispositional measures of overall well-being in life. Given that the flow measures also vary on the same dimension, we tentatively hypothesized that effect sizes reflecting a match between the timeframe of self-reported flow and well-being would be stronger than effect sizes that, for example, pair a measure of momentary well-being with a dispositional tendency to experience flow, or vice versa.

### *Measurement of Flow*

Although the definition of flow has remained relatively consistent and accepted over the years, methodologies to measure flow are highly varied (for a comprehensive review on flow measurement, see Moneta, 2021). In this meta-analysis, we will examine whether the association between flow and well-being depends on the measure used to assess flow, given considerable variability in the content and degree of validation across scales.

We identified seven measures of flow that have undergone documented, formal validation, which we compare to ad hoc measures either created for a particular study or utilized without formal validation. Regarding validated measures, Csikszentmihalyi's (1975) initial interviews led to the creation of the Flow Questionnaire (Csikszentmihalyi & Csikszentmihalyi, 1988), which uses some of the most salient quotes from the original interviews and asks participants if and under which circumstances they have experienced a similar feeling. Participants then rate their reported experiences on their level of involvement in and enjoyment of the activity, as well as perceived challenges and skills.

Later, using confirmatory factor analyses, flow researchers developed the Flow State Scale–2 (FSS-2) and the Dispositional Flow Scale–2 (DFS-2; Jackson & Eklund, 2002; Jackson et al., 2008) to assess flow both as a trait and as a state. The FSS-2 assesses the intensity of flow following a particular activity or by asking participants to think about a specific activity. The DFS-2, in contrast, measures the intensity of flow as either a general or domain-specific trait, depending on the instructions participants receive. Short versions of both the FSS-2 and the DFS-2 were derived from the long versions and also underwent significant validation efforts (Jackson et al., 2008), and all versions measure flow across its nine dimensions. Another validated scale that includes the typical nine components of flow is the Flow Short Scale (Rheinberg et al., 2003), which measures flow as an experience. The Flow Short Scale differs from the FSS-2 and DFS-2 in that it does not include an enjoyment component and includes three items assessing the perceived importance of the outcome.

Other validated flow scales do not follow the nine-component model or are modified to fit a specific context. For example, the Work-Related Flow Scale (Bakker, 2008) measures flow in work contexts and does not include all nine components of flow, and the Swedish Flow Proneness Questionnaire (Ullén et al., 2012) assesses flow experiences across the domains of work, maintenance, and leisure. Last, the Flow State Questionnaire was validated in Turkish measure and includes the dimensions of challenge–skill balance and concentration (Magyaródi et al., 2013).

Due to the degree of variation across flow measures, we expect that the way flow was assessed in a given study will moderate the association between flow and well-being in our meta-analysis. We tentatively hypothesized that validated scales (those identified above, in comparison to ad hoc scales created for use in particular studies) would have a stronger relationship with well-being due to reduced measurement error. We also noted whether scales were domain specific (referring to a particular type of activity) or domain general and the timeframe of flow captured by the scale (e.g., focused on a specific activity vs. a week's or lifetime's worth of experiences) and examined these factors as exploratory moderators.

Finally, we tested whether the association between flow and well-being was stronger for measures of flow that include one or more items assessing one's enjoyment of a given activity. Enjoyment is a form of positive affect, so we anticipated that the association would likely be stronger when the flow measure overlapped with well-being in that way.

### *Nature of the Flow Activity*

Csikszentmihalyi (1990) argued that flow can emerge from any activity, provided it meets the appropriate conditions (i.e., the components of flow). Given multidisciplinary interest in flow, the nature of flow activities varies widely across studies, from beer brewing to video games to work or daily activities. We identified two characteristics related to the flow activity that could moderate the relationship between flow and well-being: the domain of the activity and participants' familiarity with the activity. Some evidence suggests that flow experiences are more prevalent in work-related activities compared to leisure activities (Csikszentmihalyi & LeFevre, 1989); however, we know of no evidence suggesting that flow in one domain versus another has stronger effects on well-being. Thus, we did not have a hypothesis as to how domain might moderate the association between flow and well-being. Regarding personal familiarity with the flow activity, some researchers argue that the experience of flow is dependent on people's motives (Schiepe-Tiska & Engeser, 2021), meaning that even if a component of flow (e.g., challenge–skill balance) is not achieved, people can still experience flow, and therefore reap its presumed benefits for well-being, if they are personally invested in a particular activity. Thus, we expected that the relationship between flow and well-being would be stronger in studies that examined flow activities that are embedded in participants' daily lives (e.g., personal hobbies, work activities, typical daily activities) compared to studies that used a contrived and thus novel activity to induce flow.

### *Study Design*

Many studies of flow assess flow experiences in the real world, outside of the lab (e.g., during musical or sports performances; Jackson et al., 2001; Łucznik & May, 2021). Lab-based studies (e.g., Keller & Bless, 2008; K. Rankin et al., 2019), on the other hand, provide an opportunity to observe flow in a more controlled setting. We also considered whether the researchers collected data at multiple timepoints or only one time. To our knowledge, no one has directly compared the effects of flow on well-being between various types of repeated-measures studies and cross-sectional designs. Thus, we explored the role of study design as an exploratory analysis, comparing one-time assessments, experience sampling designs (i.e., more than one survey per day), daily diary studies (i.e., one survey per day), and longitudinal studies (i.e., fewer than one survey per day). In all cases, we focused on cross-sectional correlations rather than cross-lag analyses to maintain consistency across study types.

### *Sample Characteristics*

Researchers have studied flow and its correlates starting in early childhood (e.g., Inal & Cagiltay, 2007), among college students (e.g., Fullagar et al., 2013), in early and midadulthood (e.g., Carpentier et al., 2012), and in older adults (e.g., Collins et al., 2009), suggesting that flow is present (or at least possible) throughout the lifespan. We thus examined age (i.e., the average age of participants in each study) and gender (i.e., the percentage of self-identified women in the study) as exploratory factors. Similarly, the topic of flow has gained attention from researchers all over the world. In fact, studies meeting the criteria for our meta-analysis contain samples from almost every continent. Thus, we included geographical location as an additional exploratory moderator. Finally, we considered whether the study was published in a peer-reviewed journal (vs. a dissertation or unpublished data) as an exploratory moderator.

## Overview and Hypotheses

Research on the correlates of flow is widespread and abundant, with well-being being one of the most common outcomes studied. However, given the many complexities that flow entails, it is difficult to know how robust the relationship between flow and well-being actually is. Surprisingly, despite the many studies available, to our knowledge, ours is the first meta-analysis on the topic. Our hypotheses were as follows:

*Hypothesis 1:* Flow and well-being will be positively associated overall.

*Hypothesis 2:* Flow will be more strongly related to positive aspects of well-being than to negative aspects of well-being.

*Hypothesis 3:* Flow will be more strongly related to eudaimonic measures of well-being than to hedonic measures of well-being.

*Hypothesis 4:* Flow will be more strongly related to well-being when their timescales are equivalent (e.g., trait with trait, "right now" with "right now").

*Hypothesis 5:* Flow and well-being will be more strongly related when flow is measured with a validated scale than with an ad hoc scale.

*Hypothesis 6:* Flow and well-being will be more strongly related when flow is measured with a scale that includes one or more items capturing enjoyment of the activity.

*Hypothesis 7:* Flow and well-being will be more strongly related when the flow activity is personally familiar to participants rather than novel and contrived by a researcher.

*Hypothesis 8:* Flow and well-being will be more strongly related in field studies than in lab studies.

We also explored the moderating effect of specific types of well-being, cognitive versus affective well-being, the domain specificity or domain generality of the flow measure, the domain of the flow activity, the study design (various types of repeated-measures vs. cross-sectional), publication status (published in a peer-reviewed journal or not), geographical region, average age of the sample, and gender composition.

# Method

## Literature Search

Between October 2019 and October 2025, we conducted a search of relevant articles in Google Scholar (see Figure 1 for the identification and inclusion process). We conducted the search using combinations of the following key terms: *flow*, *flow state*, *flow experience*, *optimal experience*, *dispositional flow*, *well-being, well being*, *wellbeing, affect*, *satisfaction with life*, *happiness*, *distress*, *quality of life*, *emotion*, *stress*, *anxiety*, *worry*, and *positive psychology*.[3] The initial search identified over 2 million results. After narrowing our search strategy and reviewing titles and abstracts, we culled the search to 173 potential articles and dissertations.

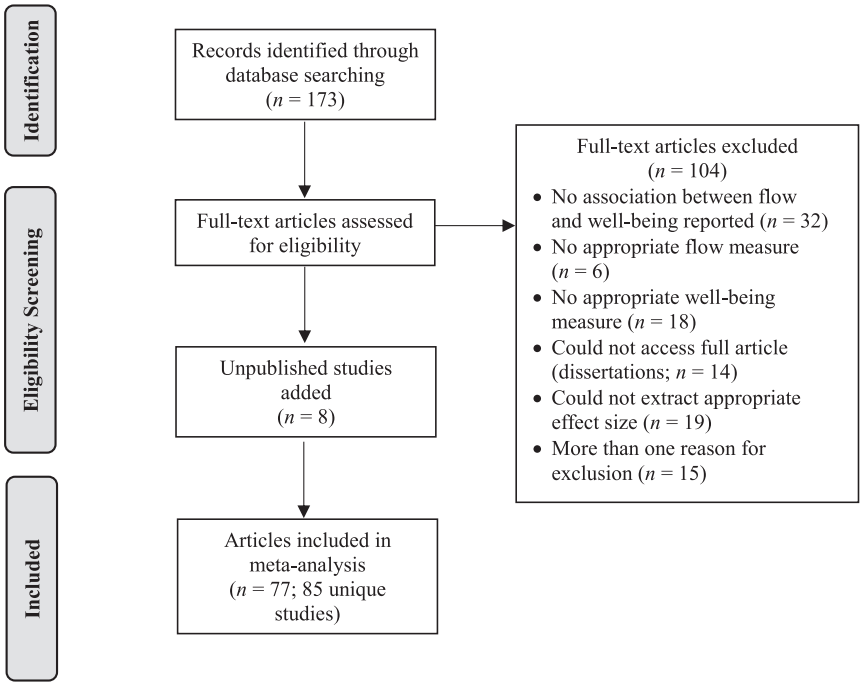
## Inclusion Criteria

Studies included in this meta-analysis needed to meet the following criteria: (a) written in English; (b) quantitative in nature (no theoretical or purely qualitative analyses); (c) included clear measures of flow and well-being; (d) was a published journal article, thesis, or dissertation or data were provided from researchers; (e) provided a correlational association between flow and well-being (given the paucity of experimental work in this area); and (f) an effect size (or sufficient information to calculate one) was provided to assess the association between flow and well-being, or the effect size could be obtained directly from authors.

Full assessment of the 173 articles based on the criteria above revealed 104 articles that did not meet the criteria and were thus excluded from analyses. We also included six additional studies that came directly from work conducted in our lab, as well as two articles from a collaborator. In the end, we included 77 articles, 85 unique studies (i.e., containing unique samples), and a total of 255 effect sizes denoting the relationship between flow and a measure of psychological well-being. In repeated-measures studies, we used effect sizes that averaged measures across timepoints (i.e., created cross-sectional associations) to maintain consistency across effect sizes.

[3] Unfortunately, the author who conducted the initial searches did not take notes on the specific combination of terms searched; she focused more on searching until all relevant articles had been identified, as marked by repeated searches and reference section-checking with no new hits.

**Figure 1**
*Diagram of the Search and Selection Procedure*




For each eligible study, we then coded the following characteristics: (1) effect size (Pearson's *r*, or converted to *r*, scored such that higher correlations indicate a stronger positive relationship between flow and well-being), (2) sample size, (3) type of well-being assessed (general anxiety/depression,[4] burnout, emotion, flourishing, happiness, loneliness, meaning, need fulfillment, psychological well-being, satisfaction with life, spiritual well-being, subjective well-being, targeted worry/anxiety, vitality), (4) valence of well-being measure (positive or negative contributor to well-being, as described earlier), (5) whether the well-being measure was more eudaimonic or hedonic in nature, (6) whether the well-being measure was more cognitive or affective in nature (among those assessing hedonic well-being), (7) well-being measurement timeframe (1 = *during a specific activity/less than 1 hr*, 2 = *that day/prior day*, 3 = *a few days to 1 week*, 4 = *a few weeks to 1 month*, 5 = *several months to a year*, 6 = *ever/all time*; treated as continuous in one analysis; we also tested a three-category approach by combining 1 and 2 [*short*] vs. 3, 4, and 5 [*mid*] vs. 6 [*long*]), (8) flow measure (Flow Short Scale, FSS-2, Flow State Questionnaire, DFS-2, Flow Short Scale, Swedish Flow Proneness Questionnaire, WORK, or other), (9) whether the flow measure had undergone prior validation (yes or no), (10) whether the flow measure was domain specific (e.g., work activities) or domain general (e.g., all activities in the past week), (11) flow measurement timeframe (same as well-being timeframe), (12) whether the flow measure included item(s) assessing enjoyment of the activity, (13) familiarity with the flow activity (i.e., whether participants were asked to do or think about something familiar to them vs. a novel activity assigned to them), (14) domain of the flow activity (academic, creative, daily activities, gaming, leisure, physical activity, work, or not applicable), (15) study design (more than daily, daily, less than daily, or one time; labeled "experience sampling method," "daily," "longitudinal," and "cross-sectional," respectively), (16) study context (field or lab), (17) publication status (peer-reviewed vs. unpublished thesis, dissertation, or data), (18) continent where the study was conducted (North America, Asia, Europe/United Kingdom, or not specified), (19) mean age of participants, and (20) percentage of female-identified participants.

## Data Analytic Approach

Traditional meta-analysis assumes independence among effect sizes. Many of the studies we included in this meta-analysis violate this assumption because they include multiple effect sizes for the same group of people, typically due to the inclusion of multiple measures of flow and/or well-being. To account for the hierarchical and correlational interdependence in our data, we opted for a multilevel approach to meta-analysis by fitting a two-level linear mixed model using restricted maximum likelihood in the SAS 9.4 *proc mixed* procedure. To avoid the problematic standard error in deriving weighted cumulative effects, we first converted correlations to Fisher's *z* for analyses (Lipsey & Wilson, 2001) and then converted back to Pearson's *r* for ease of interpretation. We then reversed associations with negative well-being indicators, such that positive *r*s always indicate that more flow is associated with better well-being.

[4] We combined measures of general anxiety and depression due to both their frequent co-occurrence in health psychology measures (e.g., Patient Health Questionnaire–4, Brief Symptom Inventory) and their high rate of comorbidity (most estimates ≈ 60%).

## Transparency and Openness

The analysis code and full meta-analytic coding file are available as additional online material at https://osf.io/r7dg4/. This meta-analysis was not preregistered.

# Results

## Study Characteristics

The meta-analysis included a total of 255 effect sizes (85 studies, 77 unique references), with a total of 34,927 participants (mean proportion female-identified = 55.94%, range = 0%–99%; $M_{age}$ = 30.02, range = 13–78). Table S1 in the additional online material (https://osf.io/r7dg4/files/s9dvu) lists all the studies included in our analyses along with the key characteristics we coded from each, and Table 1 indicates the frequency or average of each feature (last column). Table S2 in the additional online material (https://osf.io/r7dg4/files/b2vd7) lists the measures included in each category of well-being measures. Figure S1 presents a forest plot of all effect sizes (additional online tables and figures are available at https://osf.io/r7dg4/).

## Overall Effect Size

Effect sizes ranged from $r = -.50$ to .85. Sample sizes ranged from 12 to 6,326 ($M = 415.77$, $SD = 898.10$). Results from the two-level meta-analysis revealed a moderate effect size for the overall relationship between flow and well-being ($r = .36$, 95% CI [.31, .41], $p < .0001$), consistent with *Hypothesis 1*. A significant Cochran $Q$ test, $Q(254) = 6040.91$, $p < .0001$, $I^2 = 95.8\%$, indicated considerable heterogeneity among our effect sizes not simply due to sampling error.

To evaluate the influence of individual studies on the overall results, we conducted a leave-one-out analysis in which the random-intercept meta-analytic model was reestimated repeatedly, each time omitting one study ("cluster") from the data set. For each iteration, we compared the resulting fixed-effect estimates and the between-study variance component ($\tau^2$) to the baseline model that included all studies. This procedure is analogous to the *influence* and *leave1out*() diagnostics available in the R *metafor* package and identifies studies that exert disproportionate influence on model parameters. Across the set of analyses, parameter estimates were highly stable: Omitting any single study changed the estimated average effect (intercept) by less than 3% and the estimated $\tau^2$ by less than 25% (only one study exceeded 15%). These results indicate that no single study unduly influenced the overall meta-analytic findings, and we therefore included all effect sizes in our moderator analyses.

## Moderator Analyses

We tested moderators with metaregression analyses. Results of omnibus $F$ tests revealed that several well-being variables significantly moderated the relationship between flow and well-being (Table 1), namely the specific type of well-being assessed, the valence of the well-being measure, whether the measure was more hedonic or eudaimonic, and whether the measure was more cognitive or affective (within hedonic measures). Inspection of the individual effect sizes in Table 1 reveals that the strongest associations emerged in studies that assessed meaning in life, psychological need fulfillment, flourishing, and vitality, and the weakest associations emerged in studies that assessed targeted worry or anxiety (i.e., about a particular outcome or experience), happiness, burnout and occupational stress, and general anxiety and depression.

Consistent with *Hypothesis 2*, measures that focused on positive aspects of well-being (e.g., happiness, positive emotion, satisfaction with life, meaning) were more strongly associated with flow than measures that focused on negative aspects of well-being (e.g., anxiety, burnout, negative emotion). Consistent with *Hypothesis 3*, eudaimonic measures of well-being (meaning, need fulfillment, and psychological well-being) were more strongly associated with flow than hedonic measures of well-being (e.g., emotion, happiness, subjective well-being, anxiety). Although we did not have a hypothesis about the pattern of results for cognitive versus affective aspects of hedonic well-being, cognitive measures emerged as more strongly associated with flow.

Although no other omnibus moderator test was statistically significant, we report here patterns (or lack thereof) to provide a more thorough overview of our results. To test *Hypothesis 4*, we conducted an additional metaregression analyses that included timeframe for the well-being measure, timeframe for the flow measure, and their interaction. Contrary to our prediction, the interaction effect was not significant, $F(1, 153) = .05$, $p = .82$, and thus, studies that included measures of flow and well-being that were "matched" on timescale did not show stronger effects than those with "mismatched" measures. Note that the timeframe of the well-being and flow measures did not moderate the association between well-being and flow in independent models either, whether assessed as a continuous measure or as categories of short (1 day or less), mid (a few days to 1 year), or long (more than 1 year or in general) timescales.

Contrary to *Hypothesis 5*, flow and well-being were not significantly more strongly related when using validated flow scales, nor did the specific flow scale moderate the effect. Contrary to *Hypothesis 6*, the association between flow and well-being was nearly identical when using flow scales that did or did not include item(s) assessing enjoyment of the activity.

Contrary to *Hypothesis 7*, flow and well-being were not significantly more strongly related when the flow activity was personally familiar to participants, rather than novel and contrived by a researcher. Contrary to *Hypothesis 8*, the association between flow and well-being was nearly identical in field studies as in lab studies.

We also explored a variety of moderators for which we did not have hypotheses. With regard to the flow measure and activity, neither the domain specificity nor the domain of the flow activity moderated the association between flow and well-being. Finally, regarding study design and sample characteristics, neither the timing of the surveys (one time, longitudinal, daily, or experience sampling method), publication status, gender composition, average age, nor the continent where the study was conducted was a significant moderator.

## Publication Bias

To assess potential publication bias, we conducted several complementary frequentist diagnostics. Egger's regression test did not indicate significant funnel-plot asymmetry (intercept = .34, $SE = .49$, $t = .70$, $p = .486$), and Begg's rank-correlation test likewise provided no evidence of bias ($\tau = -.05$, $p = .23$). We next estimated precision-effect

**Table 1**
*Moderator Analyses by Subgroup*

| Moderator | *r* | 95% CI | *k* | *ES* |
|---|---|---|---|---|
| Well-being type | $F(13, 222) = 9.84, p \leq .0001$ | | | |
| Targeted worry/anxiety | $.08_{a}$ | [−.01, .16] | 12 | 18 |
| Happiness | $.11_{abc}$ | [−.11, .32] | 4 | 13 |
| Burnout/occupational stress | $.15_{abc}$ | [.03, .26] | 4 | 5 |
| General anxiety/depression | $.23_{bc}$ | [.15, .30] | 9 | 11 |
| Subjective well-being | $.29_{abcdef}$ | [−.02, .54] | 3 | 4 |
| Loneliness | $.30_{cd}$ | [.20, .39] | 1 | 1 |
| Psychological well-being | $.34_{bcde}$ | [.12, .53] | 3 | 8 |
| Spiritual well-being | $.36_{abcdefg}$ | [.02, .63] | 1 | 3 |
| Emotion | $.37_{de}$ | [.32, .42] | 46 | 122 |
| Satisfaction with life | $.41_{e}$ | [.35, .46] | 19 | 36 |
| Vitality | $.40_{abcdefg}$ | [.01, .68] | 3 | 3 |
| Flourishing | $.57_{fgh}$ | [.43, .68] | 3 | 7 |
| Need fulfillment | $.62_{gh}$ | [.54, .69] | 9 | 19 |
| Meaning in life | $.69_{h}$ | [.49, .83] | 3 | 5 |
| Well-being measure timeframe (continuous) | $F(1, 160) \leq .01, p = .96$ | | 85 | 255 |
| Well-being measure timeframe (categories) | $F(2, 117) = .05, p = .95$ | | | |
| Short | $.35_{a}$ | [.27, .43] | 34 | 75 |
| Mid | $.37_{a}$ | [.27, .46] | 17 | 60 |
| Long | $.36_{a}$ | [.30, .42] | 41 | 120 |
| Valence of well-being measure | $F(2, 233) = 72.43, p < .0001$ | | | |
| Positive | $.44_{a}$ | [.41, .52] | 65 | 155 |
| Negative | $.19_{b}$ | [.14, .25] | 45 | 87 |
| Combined | $.43_{a}$ | [.31, .61] | 12 | 13 |
| Type of well-being: Eudaimonic vs. hedonic[a] | $F(1, 234) = 22.69, p < .0001$ | | | |
| Eudaimonic | $.55_{a}$ | [.46, .62] | 12 | 31 |
| Hedonic | $.33_{b}$ | [.28. .37] | 81 | 216 |
| Type of well-being: Affective vs. cognitive | $F(1, 207) = 4.32, p = .04$ | | | |
| Affective | $.32_{a}$ | [.27, .36] | 65 | 168 |
| Cognitive | $.37_{b}$ | [.31. .43] | 22 | 42 |
| Flow scale | $F(7, 67.7) = .71, p = .66$ | | | |
| Flow Questionnaire | $.24_{a}$ | [−.11, .53] | 2 | 5 |
| Dispositional Flow Scale–2 | $.30_{a}$ | [.20, .40] | 17 | 74 |
| Flow State Scale–2 | $.33_{a}$ | [.21, .43] | 18 | 40 |
| Ad hoc measures | $.37_{a}$ | [.28, .44] | 31 | 78 |
| Swedish Flow Proneness Questionnaire | $.41_{a}$ | [.22, .57] | 3 | 11 |
| Flow Short Scale | $.43_{a}$ | [.30, .53] | 14 | 37 |
| Work-Related Flow Inventory | $.44_{a}$ | [.19, .63] | 2 | 9 |
| Flow Scale Questionnaire | $.51_{a}$ | [.11, .77] | 1 | 1 |
| Flow measure: Previously validated vs. ad hoc | $F(1, 71.5) = .38, p = .54$ | | | |
| Previously validated | $.35_{a}$ | [.29, .41] | 58 | 180 |
| Ad hoc | $.38_{a}$ | [.30, .46] | 47 | 75 |
| Flow measure: Domain specificity | $F(1, 114) = .82, p = .37$ | | | |
| Domain specific | $.35_{a}$ | [.29, .40] | 57 | 156 |
| Domain general | $.38_{a}$ | [.31, .45] | 34 | 95 |
| Flow measure timeframe (continuous) | $F(1, 102) = .59, p = .44$ | | 85 | 255 |
| Flow measure timeframe (categories) | $F(2, 111) = 1.93, p = .15$ | | | |
| Short | $.32_{a}$ | [.24, .39] | 37 | 102 |
| Mid | $.44_{a}$ | [.34, .53] | 14 | 51 |
| Long | $.36_{a}$ | [.30, .43] | 36 | 102 |
| Flow measure: Includes enjoyment item(s) | $F(1, 134) = .04, p = .84$ | | | |
| Yes | $.36_{a}$ | [.31, .42] | 40 | 84 |
| No | $.36_{a}$ | [.29, .41] | 53 | 171 |
| Familiarity of activity | $F(1, 87.4) = 1.00, p = .32$ | | | |
| Familiar | $.37_{a}$ | [.31, .42] | 69 | |
| New | $.28_{a}$ | [.09, .45] | 8 | |
| Flow activity category | $F(6, 65) = 1.40, p = .23$ | | | |
| Gaming | $.26_{a}$ | [.09, .42] | 9 | |
| Leisure | $.27_{a}$ | [.11, .41] | 8 | |
| Creative | $.31_{a}$ | [.17, .44] | 11 | |
| Academic | $.36_{a}$ | [.17, .53] | 5 | |
| Daily activities | $.42_{a}$ | [.33, .50] | 19 | |
| Work | $.42_{a}$ | [.31, .51] | 15 | |
| Physical activity | $.47_{a}$ | [.31, .59] | 7 | |

(*table continues*)

**Table 1** (*continued*)

| Moderator | *r* | 95% CI | *k* | *ES* |
|---|---|---|---|---|
| Study location | $F(1, 66) = .27$, $p = .61$ | | | |
| Field | $.35_a$ | [.30, .41] | 61 | |
| Lab | $.38_a$ | [.29, .46] | 24 | |
| Study design | $F(3, 63.8) = 1.45$, $p = .24$ | | | |
| One time | $.34_a$ | [.28, .39] | 53 | |
| Longitudinal (less than once per day) | $.42_a$ | [.33, .51] | 20 | |
| Daily (once per day) | $.26_a$ | [−.002, .49] | 3 | |
| ESM (more than once per day) | $.45_a$ | [.28, .60] | 9 | |
| Publication status | $F(1, 69.9) = .22$, $p = .64$ | | | |
| Peer-reviewed | $.36_a$ | [.31, .40] | 78 | |
| Unpublished thesis, dissertation, or data | $.39_a$ | [.24, .53] | 7 | |
| Gender composition (% female) | $F(1, 76.8) = .46$, $p = .50$ | | 80 | |
| Average age of participants | $F(1, 70.4) \leq .00$, $p \geq .99$ | | 70 | |
| Continent | $F(2, 55.6) = .30$, $p = .74$ | | | |
| North America | $.36_a$ | [.28, .43] | 37 | |
| Asia | $.40_a$ | [.30, .50] | 12 | |
| Europe/United Kingdom | $.37_a$ | [.28, .45] | 27 | |

*Note*. Effect sizes with different subscripts within a given moderator category differ significantly ($p < .05$). *k* refers to the number of relevant studies; for measure-level moderators, *ES* refers to the number of relevant effect sizes. CI = confidence interval; ESM = experience sampling method.

[a] Given the debate about the hedonic versus eudaimonic nature of spiritual well-being and vitality, we ran this test excluding those measures. Results were nearly identical, $F(1, 216) = 23.59$, $p < .0001$; eudaimonic well-being = .55 [.47, .63]; hedonic well-being = .32 [.27, .27].

and precision-effect with standard error metaregressions. In the precision-effect model, the intercept was significantly different from zero (estimate = .33, $SE = .02$, $t = 14.29$, $p < .0001$), and the slope for the standard error was not significant ($p = .486$), suggesting little systematic association between study precision and effect size. The precision-effect with standard error model similarly yielded a significant intercept (estimate = .34, $SE = 0.02$, $t = 20.21$, $p < .0001$). Taken together, these tests provided no consistent evidence of classic small-study or funnel-plot asymmetry and produced bias-adjusted estimates closely aligned with the overall meta-analytic effect.

## Discussion

Flow is a state of mind that emerges when a person is fully immersed in an activity (Csikszentmihalyi, 1975, 2000), and the literature is replete with studies examining the relationship between time spent in that state of mind and various aspects of psychological well-being. The purpose of this meta-analysis was to assess the overall relationship between these two constructs and test moderators of the relationship. Results from a two-level meta-analysis revealed a moderately strong and positive relationship between flow and well-being, consistent with our hypothesis and the general consensus among flow researchers.

Although this association was quite robust to variations in the measurement and context of flow experiences, the type of well-being assessed in each study was a robust moderator. Flow was more strongly associated with positive markers of well-being (e.g., happiness, positive emotion, flourishing) than negative markers (e.g., anxiety, negative emotion, burnout), with eudaimonic measures of well-being than hedonic measures, and with cognitive measures of hedonic well-being than affective measures. The timescale of the well-being measure did not moderate the association between flow and well-being, either in isolation or considering the match between its timescale and the timescale of the associated flow measure.

Taking those findings together provides some support for researchers who lump flow under the broader umbrella of eudaimonic markers of well-being, which also tend to be positive in their framing. The findings also shore up the somewhat controversial stance that flow is an emotionless state. Seligman (2011) is probably the best known proponent of that view, writing about flow in his 2011 book *Flourish* that "engagement is different, even opposite, from positive emotion; for if you ask people who are in flow what they are thinking and feeling, they usually say, 'nothing'" (p. 11). As our analysis does not permit causal conclusions, it may be that flow is an element of eudaimonic well-being that has downstream benefits for hedonic well-being; alternatively, flow may promote a sense of value and purpose, or flow may more readily occur in the context of a satisfying life well-lived.

Another question we sought to answer through this meta-analysis was whether the way researchers measure flow moderates its relationship with well-being, given researchers' ongoing pursuit of an optimal flow measure. Our results suggest that the nature of the measure mattered relatively little in the relationship between flow and well-being. Other debates about measurement also seem less compelling in light of our findings. For example, flow researchers disagree about whether enjoyment is a component of flow, and thus should be included in measures (as in the DFS-2 and FSS-2), or an outcome of flow (e.g., Abuhamdeh, 2021). In fact, flow and well-being were no more strongly associated in studies that used measures including items assessing enjoyment. Additionally, some researchers argue that methods assessing flow during or directly after a potential flow experience are more appropriate than those that rely on retrospective reflection on general experiences with flow (Barthelmäs & Keller, 2021)—yet in our analysis, timeframe of the flow measure was not a significant moderator of flow's association with well-being. The fact that these variables did not moderate the overall relationship between flow and well-being could suggest that no flow measure has yet reached the gold standard or that the conceptualization of flow is not yet precise or precisely measured; alternatively, one could interpret this

result as good news for measuring flow, such that almost any approach will do if the aim is to examine its role in well-being.

We further hypothesized that the nature of the flow activity would moderate the relationship between flow and well-being, such that activities that were more familiar and thus personal to the experiencer would be more beneficial for well-being; however, our results did not support this hypothesis. Of course, our findings align with Csikszentmihalyi's (1990) view that any activity has the potential to create flow and thus foster well-being. Still, given that autotelic experience (i.e., enjoying an activity for its own sake) is a well-accepted component of flow, the question remains: Why was flow equally associated with well-being when people were presumably relatively unmotivated to engage in the activity? Motivation research provides a potential explanation. Research in that area has identified three distinct motives: achievement, affiliation-intimacy, and power (McClelland, 1987). Each motive is concerned with meeting different needs. Given this framework, perhaps not all activities are created equal, but rather each elicits different motives in people, allowing flow to provide well-being benefits regardless of context. This explanation is speculative, and thus future research on flow and well-being should dive deeper into the various ways that flow activities can fulfill both explicit and implicit motives and thus benefit well-being (e.g., Engeser & Rheinberg, 2008).

Finally, we compared field studies to lab studies, published studies to unpublished studies, and various types of longitudinal studies to cross-sectional studies, but none of these aspects of study design moderated the association between flow and well-being. Of course, we did not capitalize on the repeated-measures nature of the longitudinal studies by, for example, examining cross-lagged relationships between flow and well-being. Such designs may be preferable due to the additional analytic opportunities they afford; our finding simply suggests that measuring flow and well-being repeatedly does not seem to affect their cross-sectional association. Last, the nature of the sample (age, gender, continent) did not moderate the strength of the association, suggesting that flow may be equally beneficial for well-being across at least some demographic groups.

## Constraints on Generality

Flow has been a topic of interest for hundreds if not thousands of researchers in many different countries and cultural settings, with a wide array of participants. That said, as with much of the psychology literature, contributions from majority world countries are sorely lacking. Thus, any conclusions we draw from this meta-analysis should be understood with that limitation firmly in mind.

## Limitations, Future Directions, and Final Thoughts

Although our results show a robust relationship between flow and well-being, we encourage readers to be cautious when drawing firm conclusions about the nature or benefits of flow. Because studies examining the relationship between flow and well-being vary in their approaches, aims, and outcome operationalizations, we expected and indeed detected significant heterogeneity among the effect sizes in the included studies. In our analyses, only dimensions of well-being emerged as a significant moderator of the relationship. However, we did not test for every possible moderator, and thus we may have missed important characteristics of measures, studies, or samples that meaningfully account for the observed variance.

Importantly, due to the dearth of experimental studies on flow and well-being, we only included correlational associations in our analyses. It is therefore possible that well-being facilitates flow rather than flow benefiting well-being or that the association arises due to a third variable. Of course, some experimental evidence documents a causal effect of flow on well-being (e.g., K. Rankin et al., 2019), but it remains possible that the relationship is bidirectional, and thus the pure effect of flow on well-being is weaker than we documented here. Further experimental evidence is needed to test the possibility that flow and well-being build on each other in a beneficial upward spiral. We also encourage researchers to publish or otherwise make available associations with dimensions or elements of flow, which are included in the most common measures of flow. Without that level of precision, the field remains in the dark as to the specific ingredients that position flow as a close associate of well-being.

A final consideration is the possibility that the benefits of flow for well-being do not follow a linear pattern. A growing body of research documents potential negative consequences of flow, such as addictive (Chou & Ting, 2003) and risk-taking behavior (Zimanyi & Schüler, 2021). Because addiction and risk-taking are not direct measures of well-being, studies of this nature were not included in our analyses. However, examination of nonlinear trajectories can provide valuable insight into the circumstances under which flow can shift from optimal experience to problematic endeavor.

Flow is a popular concept with important implications for well-being. Researchers have studied flow for over 40 years, and much is left to learn, but our meta-analysis provides a comprehensive and thus fairly definitive answer to the question of whether flow and well-being tend to arise in concert. In short, flow and well-being are robustly associated, particularly with regard to positive, eudaimonic, and cognitive forms of well-being, across myriad samples, study designs, and measures that the large field of flow researchers have used to study this complex and powerful phenomenon.

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Received March 7, 2023
Revision received December 20, 2025
Accepted December 31, 2025 ■