

Article

Self-Directed Learning and Psychological Flow Regarding the Differences Among Athletes, Musicians, and Researchers

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Abstract: Background: Self-directed learning (SDL) most appropriately is learning that is personally selected based on individual values. SDL potentially achieves psychological flow. Flow is an outcome identified and investigated by psychologist Mihaly Csikszentmihalyi. Among those whose flow he studied were individuals who engaged in self-directed careers—athletes, musicians, and researchers. **Method:** Based on their career self-direction, this investigation compares the reports of athletes, musicians, and researchers of Csikszentmihalyi through a qualitative narrative analysis of his relevant forty-seven-year publication record. The included reports have Csikszentmihalyi as an author, are an analysis of athletes, musicians, or researchers, and mention flow. The lack of an empirical study is the reason for exclusion. **Results:** The results reveal a significant difference between those who experience flow from a performance of their achieved skills and those who experience flow while learning. This examination of Csikszentmihalyi's studies regarding athletes and musicians identifies that they are most likely to experience flow during performances of their mastered skills, unlike researchers, whose flow occurs during SDL—a distinction unmentioned by Csikszentmihalyi. **Conclusions:** Although athletes and musicians may self-direct their careers, only the flow of researchers corresponds with SDL. This result meaningfully extends the literature on SDL and flow, offering direction for future empirical studies and educational opportunities.



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1. Introduction

Self-directed learning (SDL) is a psychological theory formulated in the 1970s (Knowles, 1975) of an internally regulated learning process (Amir & Bernstein, 2022) guided by what the learner values (Sun et al., 2023) occurring without a pre-determined schedule (Hartkamp-Bakker & Bradford, 2024) and undertaken for intrinsic rewards alone (Priyadarshini et al., 2024). Learners determine when learning has been achieved at the preferred level of expertise because learners take responsibility for evaluating their learning outcomes (Morris, 2024; Hamlin, 2022). If selecting a mentor, they have something unique that the learner desires or needs to understand for learning to proceed (Charokar & Dulloo, 2022)—making the age and formal qualifications of the mentor irrelevant (Lawrence et al., 2021). SDL differs from solitary learning (Mathana & Galdolage, 2023; Hamlin, 2022) that is undertaken because the learner lacks access to a teacher or because teachers or parents consider self-directed learning a necessary strategy to acquire (Tlili et al., 2022). In both cases, the SDL does not result from learner values—it is an unwanted requirement given the learning circumstances presented (Tlili et al., 2022). A free choice of self-directed learning

is necessary for it to be more than solitary learning or a curriculum-desired technique, as it provides a sense of ownership (Kalla et al., 2022). Self-directed learners require awareness of their approaches to learning, suitability for strategies for SDL, and satisfaction with SDL (Nash, 2020). Dissatisfaction with SDL is counterproductive to the habits of mind required for SDL (Ginzburg et al., 2021). To be effective, SDL requires a strong desire for both learning and self-direction, necessitating self-management skills (Kunjukunju et al., 2022) and a firmness of purpose to continue to abide by these values in times of boredom, indecision, or conflict (Hamlin, 2022). SDL also requires a similar acceptance of others as self-directed learners and acknowledging that others provide unique points of view such that understanding their values is necessary for a clear understanding of reality (Van Woezik et al., 2021).

Flow is a desired experience extending a person's mind to its limits in a voluntary effort to accomplish something valued as challenging and worthwhile such that a sense of time and place is lost (Csikszentmihalyi, 2021). This definition by Csikszentmihalyi was selected as it demonstrates his meaning of flow was continuous throughout his research career. It was first described (Engeser et al., 2021) by Csikszentmihalyi in 1975 in the same way through work examining flow in rock climbers, surgeons, composers, modern dancers, chess players, and basketball players (Csikszentmihalyi, 1975) and continued as the focus of his research program—primarily regarding creative professionals—until his death, in 2021 (Steimer, 2021).

The relationship between flow and SDL has verification in several studies, with learning flow, self-directedness, self-regulated learning ability, and learning achievement showing significant positive correlations. (Lee, 2021; Lim et al., 2021; Shao et al., 2022; Kang, 2021; Gil, 2021). The recognition is that flow and SDL are not identical (Shao et al., 2022). It is possible to be in flow while participating in games (Mahimna Vyas, 2021) or appreciating art (Vrooman et al., 2022) rather than learning. Furthermore, a person may be a self-directed learner and still be completely aware of time and place in their self-management (Nash, 2022a; Zhu, 2021) and, consequently, not in flow. Yet, according to Csikszentmihalyi, flow is inherently related to learning (Shernoff & Csikszentmihalyi, 2009). Furthermore, SDL is the preferred method of learning—"if the child becomes self-motivated, autonomous, then you have done the greatest service you can do; you have really achieved what teaching can be about, which is to set the child on a course of lifelong learning" (Csikszentmihalyi, 2014).

Although the work authored by Csikszentmihalyi regarding flow is extensive, he did not investigate the point in the flow process when SDL becomes a feature. Identifying the moment matters because a provision for educational support of self-directed learners who experience flow during the stage they engage in SDL becomes possible (Sun et al., 2023; A. Chen et al., 2023; Andrews & Sokolowski, 2023). If they are not SDL, such support might be irrelevant or detrimental (Leahy & Smith, 2021).

An investigation to examine this matter is regarding the studies of Csikszentmihalyi of three types who experience flow: athletes, musicians, and researchers. These three are selected for examination, although Csikszentmihalyi studied flow in others because they were found to experience flow regularly by Csikszentmihalyi in the course of their careers and are known to engage in SDL at some point in self-directing them (Chukwunemerem, 2023; A. Chen et al., 2023; Leahy & Smith, 2021).

A consideration of the uniqueness of flow theory identifies it as comparable to cognitive evaluation theory (Deci & Ryan, 1985). Both theories address intrinsically motivated behavior. Nevertheless, a recent examination of the relationship between the two theories found that they apply to different types of behavior. They differ in that cognitive evaluation theory relates to understanding the development of intrinsic motivation, and flow theory is

more relevant in comprehending intrinsic motivation once an activity involves skill mastery (Abuhamdeh, 2021).

Another point regarding the uniqueness of flow theory is whether it is equivalent to contemplation. Csikszentmihalyi considered this possibility and responded.

By now you have probably noticed that the experiences of flow and contemplation strongly resemble each other. On a superficial level they indeed share many similar characteristics. Because they both fundamentally involve a manipulation of attention this is not surprising. They both share a need for concentration, feedback, a goal, and a requisite amount of skill. Furthermore, they phenomenologically appear similar in manifesting a loss of self-consciousness, transformation of time, and a merging of action and awareness. These appear similar because the dynamics of attention are necessarily limited and when used to their utmost, the same outcomes arise. However, in gestalt terms, the states are phenomenologically opposite. (Hunter & Csikszentmihalyi, 2000)

In stating that flow and contemplation are phenomenologically opposite in gestalt terms, Csikszentmihalyi explains that the body in space is in the foreground for flow while in the background for contemplation. The question is whether he is correct that this differentiates flow from contemplation. When making this distinction, Csikszentmihalyi compares athletes in flow with contemplative individuals resulting from mindfulness practices. He was not conceptualizing researchers—whose flow results from mental concentration—as the body is not in the foreground for researchers in flow. Therefore, he does not offer the necessary support for a phenomenological difference between contemplation and flow in researchers. Whether psychological flow is equivalent to contemplation for researchers is a point considered in this investigation.

Neither a previous meta-analysis of work-related flow (W. Liu et al., 2023) nor an examination of SDL and flow (Shao et al., 2022) investigates the relationship of flow to SDL regarding the complete list of publications by Csikszentmihalyi that evaluate athletes, musicians, or researchers. As such, the purpose of this study—to investigate whether psychological flow is concomitant with SDL—is novel in this consideration. The finding is that this is true only for researchers experiencing flow.

2. Materials and Methods

The method to investigate the flow experienced by athletes, musicians, and researchers in studies Csikszentmihalyi authored is qualitative narrative inquiry in which the stories related of the participants become the data for analysis (Bleakley, 2005) to bridge these experiences (Weiss & Johnson-Koenke, 2023). The studies investigated are chosen from the entire list of publications by Csikszentmihalyi regarding flow. Csikszentmihalyi undertook a specific number of studies on athletes, musicians, or researchers, and these works are readily identifiable. Consequently, a scoping review to investigate the full extent of publications (Munn et al., 2022) was unnecessary. Furthermore, the purpose is to identify one particular aspect of the work by Csikszentmihalyi in this area—whether psychological flow is always associated with SDL in the three types investigated. As such, a qualitative narrative inquiry was the selected method rather than a systematic review and meta-analysis to assess the results of his work in this area. Systematic reviews answer narrow clinical questions in the PICO (population, intervention, comparison, and outcome) format (Smith & Duncan, 2022). As the intent of this examination is not to guide clinical decision-making, the delivery of care, or policy development (Munn et al., 2018), a systematic review and meta-analysis is inappropriate. To this extent, as a qualitative narrative inquiry rather than a systematic review and meta-analysis, selection bias is not a concern (Lu et al., 2022).

For this method, the inclusion criteria are that the publication has Csikszentmihalyi as an author, the work involves a study of athletes, musicians, or researchers, and the study mentions flow. The exclusion criteria are a lack of an empirical study, such as reviews of previous work for a popular magazine or a chapter in a survey book on a topic.

A search of each of the works by Csikszentmihalyi was regarding whether the work included any of the words “athletes”, “musicians”, or “researchers”. A search of those discovered after this was for their containing the word “flow”. Of those works identified, the determination was whether they were research articles from reading the abstracts—only these became part of the assessment.

A division of possible relevant publications into those concerning the stories of athletes, musicians, and research scholars came after compiling the included articles. The purpose was to access those publications of Csikszentmihalyi that provide relevant stories. For those publications that mention more than one of these occupations, the category placement chosen regards the aspect on which the stories concentrate.

Those publications focused on athletes ranged from 1984 to 2022 and numbered 17. The works on musicians were from 1976 to 2022 and equaled 15. Those studies concerning researchers—ranging from students to full-time researchers—numbered 16, published from 1988 to 2022. As Csikszentmihalyi died in October 2021 (Steimer, 2021) and there was only one posthumous publication, there are no publications by Csikszentmihalyi after 2022.

With the identification of potential studies for inclusion, the author read each of the 48 articles fully, focusing on relevant information, to determine if the mention of flow was about the stories of athletes, musicians, or researchers. Lacking a discussion of flow in telling the stories excluded the publication. The purpose of the study—to investigate the relationship between flow and SDL—justifying the exclusion as flow’s mention alone cannot provide insight into this relationship.

A list of all works considered for inclusion is in Appendix A.

3. Results

Two tables provide the results of this examination. The first, Table 1, presents the information on the relevant works listed in order of the publication dates determined by reading the content and conducting a narrative analysis (Josselson & Hammack, 2021) of each work. The publication type mentioned is because books and chapters differ in style and rigor from those published in psychology journals. Also included in Table 1 is the division focus of this study—athletes, musicians, or researchers. The final result of those included is six out of seventeen potential papers regarding athletes, four works from fifteen possible ones for musicians, and four publications of sixteen for researchers.

Table 1. Citation, title and type of publication, the category of the subjects of the publication regarding flow-mention.

Citation	Title	Type	Subjects
(Csikszentmihalyi, 1975)	<i>Beyond Boredom and Anxiety</i>	Book	Athletes
(Chalip et al., 1984)	<i>Variations of Experience in Formal and Informal Sport</i>	Article	Athletes
(Csikszentmihalyi, 1988)	<i>Motivation and creativity: Toward a synthesis of structural and energistic approaches to cognition</i>	Article	Researchers
(Wong & Csikszentmihalyi, 1991)	<i>Motivation and Academic Achievement: The Effects of Personality Traits and the duality of Experience</i>	Article	Researchers

Table 1. Cont.

Citation	Title	Type	Subjects
(Csikszentmihalyi & Schiefele, 1992)	<i>Chapter VIII: Arts Education, Human Development, and the Quality of Experience</i>	Article	Musicians
(Csikszentmihalyi & Gilbert, 1995)	<i>Singing and the Self: Choral Music as “Active Leisure”</i>	Article	Musicians
(Jackson & Csikszentmihalyi, 1999)	<i>Flow in Sports</i>	Book	Athletes
(Hunter & Csikszentmihalyi, 2000)	<i>The Phenomenology of Body–Mind: The Contrasting Cases of Flow in Sports and Contemplation</i>	Article	Athletes
(Nakamura & Csikszentmihalyi, 2001)	<i>Catalytic creativity: The case of Linus Pauling.</i>	Article	Researchers
(Csikszentmihalyi & Wolfe, 2014)	<i>New Conceptions and Research Approaches to Creativity: Implications of a Systems Perspective for Creativity in Education</i>	Chapter	Researchers
(Gute et al., 2016)	<i>Assessing Psychological Complexity in Highly Creative Persons: The Case of Jazz Pianist and Composer Oscar Peterson</i>	Article	Musicians
(Csikszentmihalyi et al., 2017)	<i>Running Flow</i>	Book	Athletes
(Csikszentmihalyi et al., 2018)	<i>Flow Theory: Optimizing Elite Performance in the Creative Realm.</i>	Chapter	Athletes
(Vrooman et al., 2022)	<i>Flow in the Arts and Humanities: On Cultivating Human Complexity</i>	Chapter	Musicians

Table 2 provides the content of the narrative analysis of the publication relevant to assessing when flow is experienced by each of the athletes, musicians, and researchers.

Table 2. Citation content corresponding to flow in athletes, musicians, and researchers arranged by publication date.

Citation	Content-Related Flow in Athletes, Musicians, or Researchers
(Csikszentmihalyi, 1975)	Nine of thirty rock climbers studied experienced flow. Those performing the most challenging climbs report becoming lost in their action, describing it as “orgiastic” unity between thoughts and action.
(Chalip et al., 1984)	There is a high positive correlation between challenges and skills during play in informal sports but not adult-supervised instruction, suggesting flow is more likely when adolescents can determine the balance between challenges and skills.
(Csikszentmihalyi, 1988)	When studying, involved students are more frequently in an inner state conducive to enjoyment than the non-involved ones, who are twice as often anxious at school and twice as likely bored doing homework. Involved students spend more time doing homework, yet they are hardly ever bored.
(Wong & Csikszentmihalyi, 1991)	When in flow, people perceive clear goals and feedback and are entirely absorbed in their experience, motivating them to seek it out again, even if it was not necessarily “pleasant”—like the students in this study, who derived immediate rewards from studying.

Table 2. *Cont.*

Citation	Content-Related Flow in Athletes, Musicians, or Researchers
(Csikszentmihalyi & Schiefele, 1992)	Forty-nine talented musicians focused on impressing others in performances of their high skills and high challenges when demonstrating flow. The opportunities for action in this regard match the ability to master the challenge.
(Csikszentmihalyi & Gilbert, 1995)	Flow is achievable when young musicians work seriously on complex interactive activities, permitting them to reach beyond mediocrity and passivity—choral directors are encouraged to promote this type of performance.
(Jackson & Csikszentmihalyi, 1999)	Flow is an elusive and sought-after psychological state that athletes, coaches, and sports psychologists have tried to understand, harness, and employ. The key consideration of flow is total absorption in the activity.
(Hunter & Csikszentmihalyi, 2000)	Flow in sports depends on a transformation of consciousness leading to optimal physical performance. Athletes push their abilities to their boundaries to experience a merging of action and awareness. Sports lend themselves to flow experiences.
(Nakamura & Csikszentmihalyi, 2001)	As a creative researcher demonstrating the qualities of flow, Linus Pauling readily absorbed lessons, guidance, and ideas throughout his career while drawing motivation from his competition and the skepticism of others rather than being paralyzed.
(Csikszentmihalyi & Wolfe, 2014)	Flow propels creativity and plays a critical role in developing complex patterns of thought and behavior in successful talent development. For potentially creative thinking to be attracted to learning the ability to formulate new problems while matching challenges with skills is an essential requirement. Creativity presupposes a community of people who share ways of thinking and acting, leading to exploration and experimentation.
(Gute et al., 2016)	By his high school years, music was already the activity that reliably produced flow for Oscar Peterson. His greatness would have been unrecognizable without public performance. When asked when he plays his best, he said, “Definitely when I’m with an audience”.
(Csikszentmihalyi et al., 2017)	Counted out of the race that morning, Shelby Hyatt ran her best race, finishing fourth at the state meet—achieving her goal and setting a personal record while running through mud in a windstorm. “It doesn’t make sense to me, but it felt easier. My breathing, my body, my legs felt like they could go forever. . . I think I flowed today”.
(Csikszentmihalyi et al., 2018)	The intrinsic motivation provided by the flow experience is pivotal in the development of creativity, partially because of the importance of deliberate practice in achieving expertise and higher levels of performance. For example, a ballet dancer will draw on existing skills but seek a higher performance level to remain in the flow state.
(Vrooman et al., 2022)	Flow is less evident when there is performance anxiety—representing an imbalance of challenge and skill. While performance settings have the clear goals and feedback necessary for flow, a performer must have sufficient self-confidence to overcome anxiety for loss of self-consciousness and merging of action and awareness for flow to occur.

3.1. Flow in Athletes, Musicians and Researchers

Stories regarding athletes, musicians, and researchers in 14 publications by Csikszentmihalyi focus on flow, with the identified narrative regarding flow for each relevant

publication in Table 2. As is evident from Table 2, more publications regard psychological flow for these occupations in the earlier years of his research program. As the research consistently validated flow in athletes, musicians, and researchers, this may be a reason for the decrease in the number of relevant publications by Csikszentmihalyi in his later years. Another reason could be his subsequent focus on other flow-related topics (T. Liu & Csikszentmihalyi, 2020; Csikszentmihalyi, 2020, 2021).

3.1.1. Athletes

The six publications authored by Csikszentmihalyi about athletes that include stories regarding achieving flow are (Csikszentmihalyi (1975), Chalip et al. (1984), Jackson and Csikszentmihalyi (1999), Hunter and Csikszentmihalyi (2000), Csikszentmihalyi et al. (2017), and Csikszentmihalyi et al. (2018)). Thus, interest in this topic spanned the entire research career of the psychologist, ending four years before his final publication in 2022—the year following his death (Kleiber, 2022).

From the summary provided for each of the six publications in Table 2, the relevance of flow to athletes became increasingly part of their repertoire when describing their experiences. Whereas in 1975, when Csikszentmihalyi began his research on flow in athletes, and few athletes reported an experience of flow, by his 2017 publication, athletes were looking to achieve flow and considered it an accomplishment when they did. This change over the decades in the perception of flow may be a result of athletic education increasingly considering achieving flow through mindfulness training as part of the curriculum (Kee & Wang, 2008) to the point that, by 2024, sports research was advising educators to “push the flow button and motivate athletes to have peak experiences and improved performance” (Connolly, 2024). As such, experiencing flow in athletic pursuits went from a dubious idea (Csikszentmihalyi, 1975) to the standard for positive psychology education of athletes (Brady & Grenville-Cleave, 2018). Given the change in the attitude of athletes regarding the notion of flow since its introduction in 1975 and that it is changes in the education athletes received that have encouraged them to consider flow integral to the experience of athletes, it would be reasonable to conclude that it is during these educational experiences that athletes report flow. However, this is not the case. Instead, the athletes in the six publications relate their feeling of flow while performing the sport with an already achieved mastery of skills. It would appear that the concentration required to learn new skills does not produce flow while engaging in a sport. Instead, flow for athletes is experienced if the activity is challenging and it uses their current level of skills to the fullest.

3.1.2. Musicians

There are four publications that Csikszentmihalyi authored regarding musicians and flow: Csikszentmihalyi and Schiefele (1992), Csikszentmihalyi and Gilbert (1995), Gute et al. (2016), and Vrooman et al. (2022). Although he began his studies of creativity in musicians early in his career (Getzels & Csikszentmihalyi, 1976), it was not until his 1992 publication that Csikszentmihalyi discussed flow and musicians—it was an interest that extended until his final, posthumous publication in 2022.

Although Csikszentmihalyi studied musicians for a period comparable to his interest in athletes, there was a greater interest in the role of sports education in promoting positive psychology that creates flow than with musicians. The finding was that creating flow in musicians depends on performance in demonstrating the integral challenge and use of skills. As such, rather than urging the choral director to promote positive psychology to create flow—as was appropriate with a sports coach—he highlighted the need to encourage a particular type of performance equated with flow.

The focus on performance for musicians regarding flow relates to the view of Csikszentmihalyi regarding creativity as existing “in a virtual space, or system, where an individual interacts with a cultural domain and with a social field” (Csikszentmihalyi, 2014). Csikszentmihalyi contrasts his view on creativity with models that consider it to arise from a mental process. According to his studies, creativity always affects “the thoughts and feelings of other members of the culture. A change that does not affect the way others think, feel, or act will not be creative. Thus, creativity presupposes a community of people who share ways of thinking and acting, who learn from each other and imitate each other’s actions” (Csikszentmihalyi & Wolfe, 2014). Consequently, an audience for a performance by a musician is necessary for deeming their flow creative.

3.1.3. Researchers

Four publications investigate researchers and flow from a broad perspective, ranging from students to full professors—Csikszentmihalyi (1988), Wong and Csikszentmihalyi (1991), Nakamura and Csikszentmihalyi (2001), Csikszentmihalyi and Wolfe (2014). Unlike his study of athletes or musicians, Csikszentmihalyi’s interest in researchers did not begin with his initial work in the mid-1970s. This interest evolved with his general considerations of flow and creativity, including musicians.

Yet, in viewing musicians and researchers as creative, Csikszentmihalyi did not highlight their flow similarly. As mentioned, for musicians, flow requires a performance to challenge and utilize their skills most effectively. In contrast, it is not presenting a paper on their research at a conference—an act of performance—that defines flow for researchers. Instead, their flow comes from the study of their preferred topic. They use their skills and perceive challenges regarding the evolution of their findings through constant learning. Investigation is the creative act that produces flow for researchers, differentiating them from musicians, where the performance defines creativity and creates flow.

As employees, researchers require self-directing to experience flow (Ștefan & Virgă, 2024; Csikszentmihalyi, 2009). As such, SDL distinguishes a researcher as experiencing flow, although the researcher may be involved in various forms of learning. Both athletes and musicians may engage in self-directed learning while developing mastery of their skills. However, it is only with researchers that SDL is integral to their achieving flow (Shao et al., 2022).

4. Discussion

Through a narrative analysis of the relevant works by Csikszentmihalyi regarding athletes, musicians, and researchers, the evidence is that flow in athletes and musicians differs from researchers in being related to performance rather than self-directed learning.

The Introduction noted that this study aims to determine if flow and contemplation for researchers are equivalent. How contemplation and flow in research differ is that contemplation regarding mindfulness activities is about intentionally directing attention, compared with daily thought. However, this intentionality is not dependent on self-directed learning, as with flow by researchers. Consequently, differentiating flow in researchers from the experience of athletes and musicians regarding self-directed learning, as has the results of this study, appears to be a robust distinction, as this variation also remains in separating flow from contemplation.

Since the death of Csikszentmihalyi in 2021, various publications have linked flow and performance in athletes and musicians and those on flow regarding self-directed learning in researchers. Consideration of these publications will determine the development of these topics post-Csikszentmihalyi. The assessments follow.

4.1. Athletes, Flow, and Performance—Recent Publications

Csikszentmihalyi regarded the skills mastery of athletes as the best representation of the level of performance required to achieve flow because it intrinsically provides the necessary dynamic interplay between individual abilities and environmental opportunities (Csikszentmihalyi et al., 2018). On the other hand, Csikszentmihalyi also reported that flow was achievable at any level of expertise in sport (Nakamura & Csikszentmihalyi, 2014), and, as such, the argument is that the portrayal of flow as a state regarding athletes is inadequate (Lange, 2024). Yet, considering that flow in athletes depends on performance achievement, what represents skills mastery regards the type of achievement to which the athlete aims. However, this is not to say there is a direct flow–performance relationship. The claim is not that flow produces peak performance—there is little evidence for flow leading to improved performance—which is revealed through a recent systematic review and meta-analysis (Harris et al., 2023). To another extreme, recent research in this area has focused on merging flow and mindfulness in athletes (Herbert & Harmat, 2022), contrary to the gestalt view of Csikszentmihalyi in arguing they are distinct and phenomenologically opposite (Hunter & Csikszentmihalyi, 2000). What remains common in the research on flow in athletes since the final publication of Csikszentmihalyi in 2022 is that there is an intimate connection of it to the performance objective of the athlete with perfectionism contributing to the quality and frequency of experiencing flow (Blachowska et al., 2023).

Regarding future research directions concerning athletes and flow based on the results of the above-mentioned studies, there are several open avenues. One is further investigating the extent to which athletes of any caliber experience flow (Lange, 2024). Although Csikszentmihalyi purported that flow is achievable by any athlete as long as they are performing at their top level of skill and feel challenged (Nakamura & Csikszentmihalyi, 2014), at the same time, he thought flow was best achieved by those who are elite athletes (Csikszentmihalyi et al., 2018). Whether the flow of both types of athletes is similar or expertise makes a difference in reporting flow requires investigation. To this extent, the causal relationship between flow and peak performance requires clarity (Harris et al., 2023). Additional research on athletes is necessary to provide it. Csikszentmihalyi believed there is a gestalt difference between flow and the type of contemplation that comes from mindfulness while engaging in athletic performance (Hunter & Csikszentmihalyi, 2000). Further studies are necessary to determine the accuracy of this belief—especially if athletic flow is equivalent to a drive to perfection in performance (Blachowska et al., 2023).

The practical implications of these investigations are that the more flow in athletes is understood, the more information can be precise to guide their expectations of achieving flow. It matters that athletes have access to such guidance because the finding is that athletes who expect to experience flow regularly develop psychosocial difficulties when these expectations are unrealized (Senecal, 2021).

4.2. Musicians, Flow, and Performance—Recent Publications

Recent research on flow and musicians has taken for granted that flow comes from performance, but some musicians cannot reach flow because of performance anxiety (Spahn et al., 2021). One publication on reducing performance anxiety suggests that future research concentrates on whether online programs promoting flow in providing performing musicians with psychological tools for performance are similarly efficacious and retentive compared with face-to-face programs (Moral-Bofill et al., 2022). In this regard, another publication investigates the musical features that induce or disrupt flow during performance. The finding is that stepwise, smooth motion in a repeated sequence is common to enter the flow state, and dissimilar syncopated motion often relates to its exit (Zielke et al., 2023). Additional research has found that engaging in musical interpretations can develop

a tendency in musicians to experience flow during musical performances (K. Chen, 2023). The application of the logistic regression method detected the most suitable predictors for identifying performing musicians with high flow levels during musical performance. Only balance, goals, feedback, and situation were statistically significant predictors of flow—gender, age, dedication, musical instrument, or style of music were not statistically significant predictors (Moral-Bofill et al., 2023).

This recent research points to suggestions for future empirical studies of musicians regarding flow. Whether performance for an audience is the best example of flow in musicians, although currently accepted (Spahn et al., 2021), has not been sufficiently demonstrated. Csikszentmihalyi conducted several studies of musicians, leading him to this conclusion (see Appendix A for the extent of these publications), but the number of musicians participating in any of these studies was limited. Studies of more musical performers of all genres are necessary before current research assumes that audience-directed performances are best at detecting flow in musicians. This need is because musicians often display performance anxiety (Moral-Bofill et al., 2022). More research is required on the relationship between flow and stage fright before educators consider it necessary to focus on performance anxiety. The reason is that this focus abates flow. The type of research that determines when musicians come in and out of flow provides a better understanding of flow that makes it more testable (Zielke et al., 2023). The suggestion is for more research teams to replicate this research on musicians. The finding that musical interpretations are beneficial for musicians to engage in flow points to questions regarding the type of interpretations (K. Chen, 2023). The focus of jazz is musical interpretations—not classical music. Whether it matters that the genre of music is directed to interpretations or not in achieving flow through musical interpretation needs further investigation. Finally, using logical regression to determine the predictors for identifying performing musicians with high flow levels during musical performances is research in its infancy (Moral-Bofill et al., 2023). Such research is promising and requires replication by various research teams.

Musicians are known to suffer from poor mental health (Musgrave, 2023; Loveday et al., 2023). Research on achieving flow in music performance is relevant because of the possibility of developing effective programs to improve mental health in musicians based on methods to encourage flow. As an example, the Consciousness, Relaxation, Attention, Fulfillment, and Transcendence (CRAFT) program—based on yoga, mindfulness, positive psychology, and emotional intelligence—is a method for self-actualization, happiness, and well-being that has been found relevant in improving the mental health of music students by helping them achieve flow more predictably (Bartos et al., 2024).

4.3. Researchers, Flow, and Self-Directed Learning—Recent Publications

The author's publication on self-direction in physics graduate education is the most relevant article on flow in researchers who engage in self-directed learning (Nash, 2022b). This article provides various evidence regarding the linkage of researcher flow to SDL. Identified in this study was that it is possible for a researcher to continuously engage in flow when working if they are a self-directed learner. A subsequent publication by the author demonstrated that work-related flow is career-sustainable in providing advice for human resources management development of career sustainability (Nash, 2024b). One recent publication notes the similarity between the flow state and the daily life of autistic persons as self-directed learners (Heasman et al., 2024). Using autistic autobiographical accounts, the authors present four principles: (1) autistic people demonstrate a unique ability to engage in and manage flow; (2) their flow may be qualitatively different from traditional models of flow; (3) difficulties in transitions into and out of flow for autistic people need examination; and, (4) the internal and external constraints to flow represent an

undiscovered potential regarding their flow. The implications discussion is how they can provide alternative explanations to previously researched phenomena and build enabling environments for autistic people, allowing their flow to flourish across various contexts. Digital learning may be how researchers of all ages—autistic and otherwise—can self-direct their learning (Nash, 2024a). However, a study of healthcare professional learning found that digital learning may prevent them from reaching flow conditions if the learning program does not match the learner's preferences, learning difficulty, or interests, requiring their adaptation to unfamiliar learning structures (Stelter et al., 2024).

Of the three types of activities that induce flow that are the focus of this study, flow in researchers has produced the least number of studies since the final publication by Csikszentmihalyi. This author has published the most on this subject in peer-reviewed journals, regarding flow in theoretical physicists (Nash, 2022b, 2024b) and flow in self-directed students (Nash, 2024a). To understand the importance of self-directed learning to flow regarding researchers in contrast to the flow produced by athletes and musicians in performance, conducting additional studies by various researchers is necessary. An intriguing study is the research comparing flow in researchers to the flow achieved by autistic individuals through hyperfocus (Heasman et al., 2024). Hyperfocus is complete absorption in a task to a point where a person appears to completely ignore everything else, most often mentioned in the context of autism, schizophrenia, and attention deficit hyperactivity disorder (Ashinoff & Abu-Akel, 2021). Further research on autism itself concerns reconsidering hyperfocus in autism as flow, as doing so repositions this trait as a strength in autistic individuals—one that can also be extended to those with attention deficit hyperactivity disorder once there is a differentiation distinguishing shallow flow states from deep flow states (Dupuis et al., 2022). This research supports the earlier findings that hyperfocus and flow are the same in considering these populations (Ashinoff & Abu-Akel, 2021)—research that has recently been replicated (Rapaport et al., 2024)—showing that hyperfocus has a negative connotation and flow one that is positive (Dupuis et al., 2022). The research on neurodivergence and flow is expanding. What is still missing from this literature is relating the flow in these neurodivergent populations to self-directed learning. The effectiveness of digital learning regarding research on flow is a largely unstudied topic (Stelter et al., 2024). Although there are scoping (Peifer et al., 2022; Daneels et al., 2021) and systematic reviews (Sajjadi et al., 2022; Cheah et al., 2022; Hammady & Arnab, 2022) on flow in playing digital games, what lacks study is the relevance of digital interface with researchers in self-directed learning regarding flow.

A significant practical implication of this research would be the reassessment of the hyperfocus of neurodivergent individuals more positively as flow. This reconsideration could reduce the stigma associated with such neurodivergence and promote a greater acceptance of these behaviors in these individuals (Worthington & Wheeler, 2023).

4.4. Limitations

A limitation of this assessment that flow in researchers is unlike flow in athletes and musicians is that it was not a distinction made by Csikszentmihalyi during his research career. As such, he did not study this effect. None of the investigated articles published by Csikszentmihalyi concerned the relationship between the experience of flow and SDL. The results, as an interpretation beyond the focus of Csikszentmihalyi, are thus limited.

Cognitive bias is a limitation of work conducted by one researcher (Soprano et al., 2024; Fernández Pinto, 2023; Neal et al., 2022). All works considered are in Appendix A. Therefore, they are available for examination to mitigate the potential cognitive bias of one researcher conducting this study.

Another limitation is that this study compared only the flow experiences of athletes, musicians, and researchers. Members of these three types of occupations all pursue their work as careers, are self-directed in managing their progress in their careers, and, at some point in developing their skills, engage in SDL. Although others that Csikszentmihalyi investigated for flow—such as game players and entrepreneurs—may meet some of these criteria, the reason for undertaking the study was to guide those who may want to support the SDL of those engaging in flow. It would seem less relevant to game players and entrepreneurs to support their engagement in flow as the SDL of these types would be contingent on the exact game played or the specific business undertaken. To this extent, they are not careers forming a pattern over the individual's lifespan (Baruch & Sullivan, 2022), as are the three types of occupations selected.

A final limitation is that this work does not attempt to guide clinical decision-making, the delivery of care, or policy development as would a systematic review and meta-analysis. It did not because the aim was limited to initially demonstrating a meaningful distinction between flow achieved through performance (as athletes and musicians demonstrate) and flow from the continuous SDL that comes from contemplation in conducting research. The next step is devising the appropriate interventions to encourage SDL at the relevant stage in the careers of athletes, musicians, and researchers. It is a limitation of this work that it does not take that next step.

5. Conclusions

Psychological flow is a topic that relates directly to individuals who self-direct. However, there is a difference between those who achieve their flow while self-directing based on a performance of their skills mastery and those who achieve flow through SDL. In differentiating individuals associated with three types of activities—athletes, musicians, and researchers—the evidence demonstrates that whereas athletes and musicians characteristically experience flow during a performance, researchers achieve flow by engaging in contemplative SDL. This distinction was not the focus of Csikszentmihalyi during his 47-year career publishing on flow in these individuals. This study aims to investigate whether psychological flow always accompanies SDL. In identifying that flow necessitates SDL for researchers, investigations can determine the type of educational supports helpful in SDL to enhance their flow, whereas, in recognizing that athletes and musicians experience flow during performance rather than SDL, such support might be irrelevant or detrimental to their flow. The impact of continuing research in this area thus will be most profound in developing appropriate educational opportunities for encouraging and supporting flow at the relevant time in career-oriented self-directed learners. Further empirical research on more and more diverse participants from each of these occupations is necessary before there can be confidence in developing particular support for SDL to enhance flow.

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Appendix A

All works by Csikszentmihalyi considered for inclusion are divided by topic, numbered, and ordered by publication dates. These do not represent all of the publications by

the psychologist, only those considered by the author to regard each of the three topics based on reading the abstracts of each work.

Athletes

1. Chalip, L., Csikszentmihalyi, M., Kleiber, D., & Larson, R. (1984). Variations of experience in formal and informal sport. *Research Quarterly for Exercise and Sport*, 55(2), 109–116. <https://doi.org/10.1080/02701367.1984.10608385>.
2. Csikszentmihalyi, M. (1985). Reflections on enjoyment. *Perspectives in Biology and Medicine*, 28(4), 489–497. <https://doi.org/10.1353/pbm.1985.0019>.
3. Csikszentmihalyi, M. (1992). A response to the Kimiecik & Stein and Jackson papers. *Journal of Applied Sport Psychology*, 4(2), 181–183. <https://doi.org/10.1080/10413209208406460>.
4. Rathunde, K., & Csikszentmihalyi, M. (1993). Undivided interest and the growth of talent: A longitudinal study of adolescents. *Journal of Youth and Adolescence*, 22(4), 385–405. <https://doi.org/10.1007/BF01537720>.
5. Csikszentmihalyi, M. (1998). Fruitless polarities. *Behavioral and Brain Sciences*, 21(3), 411. <https://doi.org/10.1017/S0140525X98261231>.
6. Csikszentmihalyi, M., & Schmidt, J. A. (1998). Chapter I: Stress and resilience in adolescence: An evolutionary perspective. *Teachers College Record: The Voice of Scholarship in Education*, 99(5), 1–17. <https://doi.org/10.1177/016146819809900501>.
7. Jackson, S. A., & Csikszentmihalyi, M. (1999). *Flow in sports*. Human Kinetics.
8. Hunter, J., & Csikszentmihalyi, M. (2000). The phenomenology of body-mind: The contrasting cases of flow in sports and contemplation. *Anthropology of Consciousness*, 11(3–4), 5–24. <https://doi.org/10.1525/ac.2000.11.3-4.5>.
9. Abuhamdeh, S., & Csikszentmihalyi, M. (2012). Attentional involvement and intrinsic motivation. *Motivation and Emotion*, 36(3), 257–267. <https://doi.org/10.1007/s11031-011-9252-7>.
10. Abuhamdeh, S., & Csikszentmihalyi, M. (2012). The importance of challenge for the enjoyment of intrinsically motivated, goal-directed activities. *Personality and Social Psychology Bulletin*, 38(3), 317–330. <https://doi.org/10.1177/0146167211427147>.
11. Csikszentmihalyi, M. (Ed.). (2014). Flow and education. In *Applications of flow in human development and education* (pp. 129–151). Springer Netherlands. https://doi.org/10.1007/978-94-017-9094-9_6.
12. Csikszentmihalyi, M. (Ed.). (2014). Toward a psychology of optimal experience. In *Flow and the foundations of positive psychology* (pp. 209–226). Springer Netherlands. https://doi.org/10.1007/978-94-017-9088-8_14.
13. Nakamura, J., & Csikszentmihalyi, M. (2014). The concept of flow. In M. Csikszentmihalyi (Ed.), *Flow and the foundations of positive psychology* (pp. 239–263). Springer Netherlands. https://doi.org/10.1007/978-94-017-9088-8_16.
14. Csikszentmihalyi, M., & Asakawa, K. (2016). Universal and cultural dimensions of optimal experiences. *Japanese Psychological Research*, 58(1), 4–13. <https://doi.org/10.1111/jpr.12104>.
15. Csikszentmihalyi, M., Latter, P., & Duranso, C. W. (2017). *Running flow*. Human Kinetics.
16. Csikszentmihalyi, M., Montijo, M. N., & Mouton, A. R. (2018). Flow theory: Optimizing elite performance in the creative realm. In S. I. Pfeiffer, E. Shaunessy-Dedrick, & M. Foley-Nicpon (Eds.), *APA handbook of giftedness and talent* (pp. 215–229). American Psychological Association. <https://doi.org/10.1037/0000038-014>.
17. Antonini Philippe, R., Singer, S. M., Jaeger, J. E. E., Biasutti, M., & Sinnett, S. (2022). Achieving flow: An exploratory investigation of elite college athletes and musicians. *Frontiers in Psychology*, 13, 831508. <https://doi.org/10.3389/fpsyg.2022.831508>.

Musicians

1. Getzels, J. W., & Csikszentmihalyi, M. (1976). The creative vision: A longitudinal study of problem finding in art. Wiley.
2. Csikszentmihalyi, M., & Schiefele, U. (1992). Chapter VIII: Arts education, human development, and the quality of experience. *Teachers College Record: The Voice of Scholarship in Education*, 93(6), 169–191. <https://doi.org/10.1177/016146819209300609>.
3. Csikszentmihalyi, M., & Gilbert, N. (1995). Singing and the self: Choral music as “active leisure”. *The Choral Journal*, 35(7), 13–19. Available online: <http://myaccess.library.utoronto.ca/login?url=https://www.proquest.com/scholarly-journals/singing-self-choral-music-as-active-leisure/docview/1306224169/se-2?accountid=14771> (accessed on 19 January 2025).
4. Csikszentmihalyi, M., Rathunde, K. R., & Whalen, S. (1997). *Talented teenagers: The roots of success and failure* (1st paperback ed.). Cambridge University Press.
5. Csikszentmihalyi, M. (1998). Fruitless polarities. *Behavioral and Brain Sciences*, 21(3), 411–411. <https://doi.org/10.1017/S0140525X98261231>.
6. Csikszentmihalyi, M. (2004). Stalking a new world order. *New Literary History*, 35(2), 339–348. <https://doi.org/10.1353/nlh.2004.0029>.
7. Csikszentmihalyi, M., & Csikszentmihalyi, I. S. (2007). Family influences on the development of giftedness. In G. R. Bock, & K. Ackrill (Eds.), *Novartis foundation symposia* (1st ed., pp. 187–206). Wiley. <https://doi.org/10.1002/9780470514498.ch12>.
8. Csikszentmihalyi, M. (Ed.). (2014). *Flow: The joy of reading*. In *Applications of flow in human development and education* (pp. 227–237). Springer Netherlands. https://doi.org/10.1007/978-94-017-9094-9_11.
9. Csikszentmihalyi, M. (Ed.). (2014). *Learning, “flow”, and happiness*. In *Applications of flow in human development and education* (pp. 153–172). Springer Netherlands. https://doi.org/10.1007/978-94-017-9094-9_7.
10. Csikszentmihalyi, M. (2014). The systems model of creativity and its applications. In D. K. Simonton (Ed.), *The wiley handbook of genius* (1st ed., pp. 533–545). Wiley. <https://doi.org/10.1002/9781118367377.ch25>.
11. Csikszentmihalyi, M., & Nakamura, J. (2014). Creativity and responsibility. In M. Csikszentmihalyi (Ed.), *The systems model of creativity* (pp. 279–292). Springer Netherlands. https://doi.org/10.1007/978-94-017-9085-7_17.
12. Csikszentmihalyi, M., & Wolfe, R. (2014). New conceptions and research approaches to creativity: Implications of a systems perspective for creativity in education. In M. Csikszentmihalyi (Ed.), *The systems model of creativity* (pp. 161–184). Springer Netherlands. https://doi.org/10.1007/978-94-017-9085-7_10.
13. Gute, G., Gute, D., & Csikszentmihalyi, M. (2016). Assessing psychological complexity in highly creative persons: The case of jazz pianist and composer Oscar Peterson. *Journal of Genius and Eminence*, 1(1), 16–27. <https://doi.org/10.18536/jge.2016.01.1.1.03>.
14. Finley, K. P., & Csikszentmihalyi, M. (2018). Why bother being different? The role of intrinsic motivation in creativity. In B. Wallace, D. A. Sisk, & J. Senior (Eds.), *The SAGE handbook of gifted and talented education* (pp. 83–91). SAGE Publications Ltd. <https://doi.org/10.4135/9781526463074.n9>.
15. Vrooman, K., Finley, K. P., Nakamura, J., & Csikszentmihalyi, M. (2022). Flow in the arts and humanities: On cultivating human complexity. In L. Tay, & J. O. Pawelski (Eds.), *The oxford handbook of the positive humanities* (1st ed., pp. 210–221). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780190064570.001.0001>.

Researchers

1. Csikszentmihalyi, M. (1988). Motivation and creativity: Toward a synthesis of structural and energistic approaches to cognition. *New Ideas in Psychology*, 6(2), 159–176. [https://doi.org/10.1016/0732-118X\(88\)90001-3](https://doi.org/10.1016/0732-118X(88)90001-3).
2. Wong, M. M., & Csikszentmihalyi, M. (1991). Motivation and academic achievement: The effects of personality traits and the duality of experience. *Journal of Personality*, 59(3), 539–574. <https://doi.org/10.1111/j.1467-6494.1991.tb00259.x>.
3. Schiefele, U., & Csikszentmihalyi, M. (1994). Interest and the quality of experience in classrooms. *European Journal of Psychology of Education*, 9(3), 251–269. <https://doi.org/10.1007/BF03172784>.
4. Nakamura, J., & Csikszentmihalyi, M. (2001). Catalytic creativity: The case of Linus Pauling. *American Psychologist*, 56(4), 337–341. <https://doi.org/10.1037/0003-066X.56.4.337>.
5. Berg, G. A., Csikszentmihalyi, M., & Nakamura, J. (2003). Mission possible?: Enabling good work in higher education. *Change: The Magazine of Higher Learning*, 35(5), 40–47. <https://doi.org/10.1080/00091380309604118>.
6. Shernoff, D. J., Csikszentmihalyi, M., Shneider, B., & Shernoff, E. S. (2003). Student engagement in high school classrooms from the perspective of flow theory. *School Psychology Quarterly*, 18(2), 158–176. <https://doi.org/10.1521/scpq.18.2.158.21860>.
7. Shernoff, D. J., & Csikszentmihalyi, M. (2009). Flow in schools: Cultivating engaged learners and optimal learning environments. In M. J. Furlong, R. Gilman, & E. S. Huebner (Eds.), *Handbook of positive psychology in schools* (pp. 149–164). Routledge. <https://doi.org/10.4324/9780203884089-20>.
8. Abuhamdeh, S., & Csikszentmihalyi, M. (2012). The importance of challenge for the enjoyment of intrinsically motivated, goal-directed activities. *Personality and Social Psychology Bulletin*, 38(3), 317–330. <https://doi.org/10.1177/0146167211427147>.
9. Csikszentmihalyi, M. (Ed.). (2014). Flow and Education. In *Applications of flow in human development and education* (pp. 129–151). Springer Netherlands. https://doi.org/10.1007/978-94-017-9094-9_6.
10. Csikszentmihalyi, M. (Ed.). (2014). Learning, “flow”, and happiness. In *Applications of flow in human development and education* (pp. 153–172). Springer Netherlands. https://doi.org/10.1007/978-94-017-9094-9_7.
11. Csikszentmihalyi, M., & Wolfe, R. (2014). New conceptions and research approaches to creativity: Implications of a systems perspective for creativity in education. In M. Csikszentmihalyi (Ed.), *The systems model of creativity* (pp. 161–184). Springer Netherlands. https://doi.org/10.1007/978-94-017-9085-7_10.
12. Furlong, M. J., Gilman, R., & Huebner, E. S. (Eds.). (2014). Student engagement. In *Handbook of positive psychology in schools* (pp. 184–199). Routledge. <https://doi.org/10.4324/9780203106525-17>.
13. Spurlin, S., & Csikszentmihalyi, M. (2017). Will work ever be fun again? In C. Fullagar, & A. Delle Fave (Eds.), *Flow at work* (1st ed., pp. 176–189). Routledge. <https://doi.org/10.4324/9781315871585-10>.
14. Tse, D. C. K., Nakamura, J., & Csikszentmihalyi, M. (2020). Beyond challenge-seeking and skill-building: Toward the lifespan developmental perspective on flow theory. *The Journal of Positive Psychology*, 15(2), 171–182. <https://doi.org/10.1080/17439760.2019.1579362>.
15. Heutte, J., Fenouillet, F., Martin-Krumm, C., Gute, G., Raes, A., Gute, D., Bachelet, R., & Csikszentmihalyi, M. (2021). Optimal experience in adult learning: Conception and validation of the flow in education scale (EduFlow-2). *Frontiers in Psychology*, 12, 828027. <https://doi.org/10.3389/fpsyg.2021.828027>.

16. Kukita, A., Nakamura, J., & Csikszentmihalyi, M. (2022). How experiencing autonomy contributes to a good life. *The Journal of Positive Psychology*, 17(1), 34–45. <https://doi.org/10.1080/17439760.2020.1818816>.

References

- Abuhamdeh, S. (2021). Flow theory and cognitive evaluation theory: Two sides of the same coin? In C. Peifer, & S. Engeser (Eds.), *Advances in flow research* (pp. 137–153). Springer International Publishing. [\[CrossRef\]](#)
- Amir, I., & Bernstein, A. (2022). Dynamics of internal attention and internally-directed cognition: The Attention-to-Thoughts (A2T) model. *Psychological Inquiry*, 33(4), 239–260. [\[CrossRef\]](#)
- Andrews, B. W., & Sokolowski, J. (2023). Self-directed music education: Learning from the inside out. *Canadian Music Educator*, 65(2), 14–19. Available online: <https://www.proquest.com/openview/0e582a6d3c782fee5ce3e6fb76e2589c/1?pq-origsite=gscholar&cbl=45770> (accessed on 26 January 2025).
- Ashinoff, B. K., & Abu-Akel, A. (2021). Hyperfocus: The forgotten frontier of attention. *Psychological Research*, 85(1), 1–19. [\[CrossRef\]](#)
- Bartos, L. J., Posadas, M. P., Wrapson, W., & Krägeloh, C. (2024). The CRAFT program: Mindfulness and yoga for enhancing the well-being and academic experience of higher education student musicians. *Journal of Humanistic Psychology*, 00221678241233991. [\[CrossRef\]](#)
- Baruch, Y., & Sullivan, S. E. (2022). The why, what and how of career research: A review and recommendations for future study. *Career Development International*, 27(1), 135–159. [\[CrossRef\]](#)
- Blachowska, A., Waleriańczyk, W., & Stolarski, M. (2023). Striving for a perfect flow: Testing the 2 × 2 model of perfectionism in trail runners. *Personality and Individual Differences*, 212, 112278. [\[CrossRef\]](#)
- Bleakley, A. (2005). Stories as data, data as stories: Making sense of narrative inquiry in clinical education*: Original article. *Medical Education*, 39(5), 534–540. [\[CrossRef\]](#) [\[PubMed\]](#)
- Brady, A., & Grenville-Cleave, B. (Eds.). (2018). *Positive psychology in sport and physical activity: An introduction* (1st ed.). Routledge. [\[CrossRef\]](#)
- Chalip, L., Csikszentmihalyi, M., Kleiber, D., & Larson, R. (1984). Variations of experience in formal and informal sport. *Research Quarterly for Exercise and Sport*, 55(2), 109–116. [\[CrossRef\]](#)
- Charokar, K., & Dulloo, P. (2022). Self-directed learning theory to practice: A footstep towards the path of being a life-long learner. *Journal of Advances in Medical Education & Professionalism*, 10(3), 135–144. [\[CrossRef\]](#)
- Cheah, I., Shimul, A. S., & Phau, I. (2022). Motivations of playing digital games: A review and research agenda. *Psychology & Marketing*, 39(5), 937–950. [\[CrossRef\]](#)
- Chen, A., Liu, H., Li, K.-C., & Jia, J. (2023). For educational inclusiveness: Design and implementation of an intelligent tutoring system for student-athletes based on self-determination theory. *Sustainability*, 15(20), 14709. [\[CrossRef\]](#)
- Chen, K. (2023). Musical interpretative practices as a way to improve the relationship between the flow theory and musical performance. *Psychology of Music*, 51(4), 1288–1301. [\[CrossRef\]](#)
- Chukwunemerem, O. P. (2023). Lessons from self-directed learning activities and helping university students think critically. *Journal of Education and Learning*, 12(2), 79. [\[CrossRef\]](#)
- Connolly, G. J. (2024). Elevating athletic performance with flow theory: “Being in the zone”. *Strategies*, 37(1), 33–36. [\[CrossRef\]](#)
- Csikszentmihalyi, M. (1975). *Beyond boredom and anxiety* (1st ed.). The Jossey-Bass Behavioral Science Series. Jossey-Bass Publishers.
- Csikszentmihalyi, M. (1988). Motivation and creativity: Toward a synthesis of structural and energistic approaches to cognition. *New Ideas in Psychology*, 6(2), 159–176. [\[CrossRef\]](#)
- Csikszentmihalyi, M. (2009). *Flow: The psychology of optimal experience*. Nachdr. Harper Perennial Modern Classics. Harper [and] Row.
- Csikszentmihalyi, M. (Ed.). (2014). Flow and education. In *Applications of flow in human development and education* (pp. 129–151). Springer. [\[CrossRef\]](#)
- Csikszentmihalyi, M. (2020). Positive psychology and a positive worldview: New hope for the future of humankind. In S. I. Donaldson, M. Csikszentmihalyi, & J. Nakamura (Eds.), *Positive psychological science: Improving everyday life, health, work, education, and societies across the globe* (2nd ed., pp. 256–265). Routledge, Taylor & Francis Group.
- Csikszentmihalyi, M. (2021). Flow: A component of the good life. In A. Kostić, & D. Chadee (Eds.), *Positive psychology: An international perspective* (1st ed., pp. 193–201). Wiley. [\[CrossRef\]](#)
- Csikszentmihalyi, M., & Gilbert, N. (1995). Singing and the self: Choral music as “active leisure”. *The Choral Journal*, 35(7), 13–19. Available online: <http://myaccess.library.utoronto.ca/login?url=https://www.proquest.com/scholarly-journals/singing-self-choral-music-as-active-leisure/docview/1306224169/se-2?accountid=14771> (accessed on 19 January 2025).
- Csikszentmihalyi, M., Latter, P., & Duranso, C. W. (2017). *Running flow*. Human Kinetics.

- Csikszentmihalyi, M., Montijo, M. N., & Mouton, A. R. (2018). Flow theory: Optimizing elite performance in the creative realm. In S. I. Pfeiffer, E. Shaunessy-Dedrick, & M. Foley-Nicpon (Eds.), *APA handbook of giftedness and talent* (pp. 215–229). American Psychological Association. [\[CrossRef\]](#)
- Csikszentmihalyi, M., & Schiefele, U. (1992). Chapter VIII: Arts education, human development, and the quality of experience. *Teachers College Record: The Voice of Scholarship in Education*, 93(6), 169–191. [\[CrossRef\]](#)
- Csikszentmihalyi, M., & Wolfe, R. (2014). New conceptions and research approaches to creativity: Implications of a systems perspective for creativity in education. In M. Csikszentmihalyi (Ed.), *The systems model of creativity* (pp. 161–184). Springer. [\[CrossRef\]](#)
- Daneels, R., Bowman, N. D., Possler, D., & Mekler, E. D. (2021). The ‘eudaimonic experience’: A scoping review of the concept in digital games research. *Media and Communication*, 9(2), 178–190. [\[CrossRef\]](#)
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Perspectives in Social Psychology. Plenum Press.
- Dupuis, A., Mudiyansele, P., Burton, C. L., Arnold, P. D., Crosbie, J., & Schachar, R. J. (2022). Hyperfocus or flow? Attentional strengths in autism spectrum disorder. *Frontiers in Psychiatry*, 13, 886692. [\[CrossRef\]](#) [\[PubMed\]](#)
- Engeser, S., Schiepe-Tiska, A., & Peifer, C. (2021). Historical lines and an overview of current research on flow. In C. Peifer, & S. Engeser (Eds.), *Advances in flow research* (pp. 1–29). Springer International Publishing. [\[CrossRef\]](#)
- Fernández Pinto, M. (2023). Methodological and cognitive biases in science: Issues for current research and ways to counteract them. *Perspectives on Science*, 31(5), 535–554. [\[CrossRef\]](#)
- Getzels, J. W., & Csikszentmihalyi, M. (1976). *The creative vision: A longitudinal study of problem finding in art*. Wiley.
- Gil, C.-R. (2021). Relationship between self-directed learning ability, learning flow, academic self-efficacy, and academic achievement of nursing students’. *Journal of Digital Convergence*, 19(12), 617–626. [\[CrossRef\]](#)
- Ginzburg, S. B., Santen, S. A., & Schwartzstein, R. M. (2021). Self-directed learning: A new look at an old concept. *Medical Science Educator*, 31(1), 229–230. [\[CrossRef\]](#) [\[PubMed\]](#)
- Gute, G., Gute, D., & Csikszentmihalyi, M. (2016). Assessing psychological complexity in highly creative persons: The case of jazz pianist and composer Oscar Peterson. *Journal of Genius and Eminence*, 1(1), 16–27. [\[CrossRef\]](#)
- Hamlin, M. D. (2022). Developing self-directed learning skills for lifelong learning. In P. Hughes, & J. Yarbrough (Eds.), *Advances in higher education and professional development* (pp. 209–234). IGI Global. [\[CrossRef\]](#)
- Hammady, R., & Arnab, S. (2022). Serious gaming for behaviour change: A systematic review. *Information*, 13(3), 142. [\[CrossRef\]](#)
- Harris, D. J., Allen, K. L., Vine, S. J., & Wilson, M. R. (2023). A systematic review and meta-analysis of the relationship between flow states and performance. *International Review of Sport and Exercise Psychology*, 16(1), 693–721. [\[CrossRef\]](#)
- Hartkamp-Bakker, C., & Bradford, M. R. (2024). Guest editorial: Reimagined ways of knowing, being and doing: Understanding the value of a self-directed educational context. *On the Horizon: The International Journal of Learning Futures*, 32(2/3), 49–55. [\[CrossRef\]](#)
- Heasman, B., Williams, G., Charura, D., Hamilton, L. G., Milton, D., & Murray, F. (2024). Towards autistic flow theory: A non-pathologising conceptual approach. *Journal for the Theory of Social Behaviour*, 54(4), 469–497. [\[CrossRef\]](#)
- Herbert, A., & Harmat, L. (2022). A dual model of mindfulness and flow, shared neural substrates. In T. Chemi, E. Brattico, L. O. Fjorback, & L. Harmat (Eds.), *Arts and mindfulness education for human flourishing* (1st ed., pp. 11–26). Routledge. [\[CrossRef\]](#)
- Hunter, J., & Csikszentmihalyi, M. (2000). The phenomenology of body-mind: The contrasting cases of flow in sports and contemplation. *Anthropology of Consciousness*, 11(3–4), 5–24. [\[CrossRef\]](#)
- Jackson, S. A., & Csikszentmihalyi, M. (1999). *Flow in sports*. Human Kinetics.
- Josselson, R., & Hammack, P. L. (2021). *Essentials of narrative analysis*. American Psychological Association. [\[CrossRef\]](#)
- Kalla, M., Jerowsky, M., Howes, B., & Borda, A. (2022). Expanding formal school curricula to foster action competence in sustainable development: A proposed free-choice project-based learning curriculum. *Sustainability*, 14(23), 16315. [\[CrossRef\]](#)
- Kang, S. (2021). Self-directed learning strategy, learning flow, teaching presence, and learning satisfaction of nursing college students in non-face-to-face online classes. *Journal of Advanced Researches and Reports*, 1(2), 83–90. [\[CrossRef\]](#)
- Kee, Y. H., & Wang, J. C. K. (2008). Relationships between mindfulness, flow dispositions and mental skills adoption: A cluster analytic approach. *Psychology of Sport and Exercise*, 9(4), 393–411. [\[CrossRef\]](#)
- Kleiber, D. (2022). Mihaly Csikszentmihalyi: A galvanizing force for the study of experience in the context of leisure. *Journal of Leisure Research*, 53(2), 187–190. [\[CrossRef\]](#)
- Knowles, M. S. (1975). *Self-directed learning: A guide for learners and teachers*. Association Press.
- Kunjukunju, A., Ahmad, A., & Yusof, P. (2022). Self-directed learning skills of undergraduate nursing students. *Enfermería Clínica*, 32, S15–S19. [\[CrossRef\]](#)
- Lange, V. (2024). Flow and athletic experts, 1–22. *Erkenntnis*. [\[CrossRef\]](#)
- Lawrence, J., Dimashkie, B., Centea, D., & Singh, I. (2021). The learning factory: Self-directed project-based education. In M. E. Auer, & D. Centea (Eds.), *Visions and concepts for education 4.0* (Vol. 1314, pp. 114–122). Advances in Intelligent Systems and Computing. Springer International Publishing. [\[CrossRef\]](#)

- Leahy, K. S., & Smith, T. D. (2021). The self-directed learning of adult music students: A comparison of teacher approaches and student needs. *International Journal of Music Education*, 39(3), 289–300. [\[CrossRef\]](#)
- Lee, J. E. (2021). Learning flow, self-directedness, self-regulated learning ability and learning achievement of nursing students who in non-face-to-face learning environment. *The Journal of the Convergence on Culture Technology*, 7(4), 511–517. [\[CrossRef\]](#)
- Lim, J. M., Kim, S. H., Baek, M. J., & Kim, K. H. (2021). The effect of university students' learning flow, self-directed learning, and learning outcomes on uncontacted online class satisfaction. *Journal of Digital Convergence*, 19(4), 393–401. [\[CrossRef\]](#)
- Liu, T., & Csikszentmihalyi, M. (2020). Flow among introverts and extraverts in solitary and social activities. *Personality and Individual Differences*, 167, 110197. [\[CrossRef\]](#)
- Liu, W., Lu, H., Li, P., Van Der Linden, D., & Bakker, A. B. (2023). Antecedents and outcomes of work-related flow: A meta-analysis. *Journal of Vocational Behavior*, 144, 103891. [\[CrossRef\]](#)
- Loveday, C., Musgrave, G., & Gross, S.-A. (2023). Predicting anxiety, depression, and wellbeing in professional and nonprofessional musicians. *Psychology of Music*, 51(2), 508–522. [\[CrossRef\]](#)
- Lu, H., Cole, S. R., Howe, C. J., & Westreich, D. (2022). Toward a clearer definition of selection bias when estimating causal effects. *Epidemiology*, 33(5), 699–706. [\[CrossRef\]](#) [\[PubMed\]](#)
- Mahimna Vyas. (2021). Experience of flow in games and using it to improve well-being: A critical review. *Indian Journal of Health and Wellbeing*, 11(1), 116–120. [\[CrossRef\]](#)
- Mathana, S., & Galdolage, B. S. (2023). The effect of self-directed learning motives and students' cooperation on the success of online learning: The moderating effect of resource availability. *Journal of Business and Technology*, 7(1), 1–24. [\[CrossRef\]](#)
- Moral-Bofill, L., López De La Llave, A., & Pérez-Llantada, M. C. (2023). Predictors of flow state in performing musicians: An analysis with the logistic regression method. *Frontiers in Psychology*, 14, 1271829. [\[CrossRef\]](#)
- Moral-Bofill, L., López De La Llave, A., Pérez-Llantada, M. C., & Holgado-Tello, F. P. (2022). Development of flow state self-regulation skills and coping with musical performance anxiety: Design and evaluation of an electronically implemented psychological program. *Frontiers in Psychology*, 13, 899621. [\[CrossRef\]](#) [\[PubMed\]](#)
- Morris, T. H. (2024). Four dimensions of self-directed learning: A fundamental meta-competence in a changing world. *Adult Education Quarterly*, 74(3), 236–254. [\[CrossRef\]](#)
- Munn, Z., Peters, M. D. J., Stern, C., Tufanaru, C., McArthur, A., & Aromataris, E. (2018). Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Medical Research Methodology*, 18(1), 143. [\[CrossRef\]](#) [\[PubMed\]](#)
- Munn, Z., Pollock, D., Khalil, H., Alexander, L., McInerney, P., Godfrey, C. M., Peters, M., & Tricco, A. C. (2022). What are scoping reviews? Providing a formal definition of scoping reviews as a type of evidence synthesis. *JBIM Evidence Synthesis*, 20(4), 950–952. [\[CrossRef\]](#)
- Musgrave, G. (2023). Music and wellbeing vs. musicians' wellbeing: Examining the paradox of music-making positively impacting wellbeing, but musicians suffering from poor mental health. *Cultural Trends*, 32(3), 280–295. [\[CrossRef\]](#)
- Nakamura, J., & Csikszentmihalyi, M. (2001). Catalytic creativity: The case of Linus Pauling. *American Psychologist*, 56(4), 337–341. [\[CrossRef\]](#)
- Nakamura, J., & Csikszentmihalyi, M. (2014). The concept of flow. In M. Csikszentmihalyi (Ed.), *Flow and the foundations of positive psychology* (pp. 239–263). Springer. [\[CrossRef\]](#)
- Nash, C. (2020). Challenges identifying and stimulating self-directed learning in publicly funded programs. In C. S. Keator (Ed.), *The digital era of learning: Novel educational strategies and challenges for teaching students in the 21st century* (pp. 259–300). Education in a Competitive and Globalizing World. Nova Science Publishers.
- Nash, C. (2022a). Self-direction in physics graduate education: David J. Rowe's career-long commitment. Preprint. *Physical Sciences*. [\[CrossRef\]](#)
- Nash, C. (2022b). Self-direction in physics graduate education: Insights for STEM from David J. Rowe's career-long methods. *Challenges*, 13(2), 45. [\[CrossRef\]](#)
- Nash, C. (2024a). A scoping review of children, empowerment, and smartphone technology regarding social construction theory with the aim of increasing self-direction in democracies. *Social Sciences*, 13(4), 196. [\[CrossRef\]](#)
- Nash, C. (2024b). Work-related flow in contrast to either happiness or PERMA factors for human resources management development of career sustainability. *Psych*, 6(1), 356–375. [\[CrossRef\]](#)
- Neal, T. M. S., Lienert, P., Denne, E., & Singh, J. P. (2022). A general model of cognitive bias in human judgment and systematic review specific to forensic mental health. *Law and Human Behavior*, 46(2), 99–120. [\[CrossRef\]](#) [\[PubMed\]](#)
- Peifer, C., Wolters, G., Harmat, L., Heutte, J., Tan, J., Freire, T., Tavares, D., Fonte, C., Andersen, F. O., Van Den Hout, J., Šimleša, M., Pola, L., Ceja, L., & Triberti, S. (2022). A scoping review of flow research. *Frontiers in Psychology*, 13, 815665. [\[CrossRef\]](#)

- Priyadarshini, V., Maheswary, U., Swami, K., Kumar, M. D., Madhusudhanan, R., & Chandrakhanthan, J. (2024). Fostering self-directed learning among millennial and gen Z learners through e-learning platforms and ICT. In R. El Khoury (Ed.), *Anticipating future business trends: Navigating artificial intelligence innovations* (Vol. 535, pp. 129–136). Studies in Systems, Decision and Control. Springer Nature. [CrossRef]
- Rapaport, H., Clapham, H., Adams, J., Lawson, W., Porayska-Pomsta, K., & Pellicano, E. (2024). “In a state of flow”: A qualitative examination of autistic adults’ phenomenological experiences of task immersion. *Autism in Adulthood*, 6(3), 362–373. [CrossRef]
- Sajjadi, P., Ewais, A., & De Troyer, O. (2022). Individualization in serious games: A systematic review of the literature on the aspects of the players to adapt to. *Entertainment Computing*, 41, 100468. [CrossRef]
- Senecal, G. (2021). The aftermath of peak experiences: Difficult transitions for contact sport athletes. *The Humanistic Psychologist*, 49(2), 295–313. [CrossRef]
- Shao, M., Hong, J.-C., & Zhao, L. (2022). Impact of the self-directed learning approach and attitude on online learning ineffectiveness: The mediating roles of internet cognitive fatigue and flow state. *Frontiers in Public Health*, 10, 927454. [CrossRef] [PubMed]
- Shermoff, D. J., & Csikszentmihalyi, M. (2009). Flow in schools: Cultivating engaged learners and optimal learning environments. In M. J. Furlong, R. Gilman, & E. S. Huebner (Eds.), *Handbook of positive psychology in schools* (pp. 149–164). Routledge. [CrossRef]
- Smith, S. A., & Duncan, A. A. (2022). Systematic and scoping reviews: A comparison and overview. *Seminars in Vascular Surgery*, 35(4), 464–469. [CrossRef] [PubMed]
- Soprano, M., Roitero, K., La Barbera, D., Ceolin, D., Spina, D., Demartini, G., & Mizzaro, S. (2024). Cognitive biases in fact-checking and their countermeasures: A review. *Information Processing & Management*, 61(3), 103672. [CrossRef]
- Spahn, C., Krampe, F., & Nusseck, M. (2021). Live music performance: The relationship between flow and music performance anxiety. *Frontiers in Psychology*, 12, 725569. [CrossRef]
- Steimer, S. (2021, October 28). Mihaly Csikszentmihalyi, pioneering psychologist and ‘father of flow’, 1934–2021. UChicago News. Available online: <https://news.uchicago.edu/story/mihaly-csikszentmihalyi-pioneering-psychologist-and-father-flow-1934-2021> (accessed on 15 February 2025).
- Stelter, M., Malek, M., Halek, M., Ehlers, J., & Nitsche, J. (2024). Learning experiences and didactic needs of german healthcare professions: A focus group study for the design of personalized interprofessional further education in dementia healthcare. *Machine Learning and Knowledge Extraction*, 6(3), 1510–1530. [CrossRef]
- Sun, W., Hong, J.-C., Dong, Y., Huang, Y., & Fu, Q. (2023). Self-directed learning predicts online learning engagement in higher education mediated by perceived value of knowing learning goals. *The Asia-Pacific Education Researcher*, 32(3), 307–316. [CrossRef]
- Ștefan, A. D., & Virgă, D. (2024). Self-leadership, performance, and life-satisfaction: The mediation role of flow at work in a three-wave study. *The Journal of Psychology*, 1–21. [CrossRef]
- Tlili, A., Burgos, D., Olivier, J., & Huang, R. (2022). Self-directed learning and assessment in a crisis context: The COVID-19 pandemic as a case study. *Journal of E-Learning and Knowledge Society*, 18, 1–10. [CrossRef]
- Van Woezik, T. E. T., Koksma, J. J.-J., Reuzel, R. P. B., Jaarsma, D. C., & Van Der Wilt, G. J. (2021). There is more than ‘I’ in self-directed learning: An exploration of self-directed learning in teams of undergraduate students. *Medical Teacher*, 43(5), 590–598. [CrossRef] [PubMed]
- Vrooman, K., Finley, K. P., Nakamura, J., & Csikszentmihalyi, M. (2022). Flow in the arts and humanities: On cultivating human complexity. In L. Tay, & J. O. Pawelski (Eds.), *The oxford handbook of the positive humanities* (1st ed., pp. 210–221). Oxford University Press. [CrossRef]
- Weiss, C. R., & Johnson-Koenke, R. (2023). Narrative inquiry as a caring and relational research approach: Adopting an evolving paradigm. *Qualitative Health Research*, 33(5), 388–399. [CrossRef]
- Wong, M. M., & Csikszentmihalyi, M. (1991). Motivation and academic achievement: The effects of personality traits and the duality of experience. *Journal of Personality*, 59(3), 539–574. [CrossRef] [PubMed]
- Worthington, R., & Wheeler, S. (2023). Hyperfocus and offending behaviour: A systematic review. *The Journal of Forensic Practice*, 25(3), 185–200. [CrossRef]
- Zhu, M. (2021). Enhancing MOOC learners’ skills for self-directed learning. *Distance Education*, 42(3), 441–460. [CrossRef]
- Zielke, J., Anglada-Tort, M., & Berger, J. (2023). Inducing and disrupting flow during music performance. *Frontiers in Psychology*, 14, 1187153. [CrossRef] [PubMed]

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