



Move freely! – A theoretical overview of the mechanism of movement improvisation

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ABSTRACT

In recent years, psychological research has increasingly explored interventions that integrate art forms, including movement improvisation. However, research on movement improvisation lacks a unified empirical groundwork and the findings in the field of movement are inconsistent due to several different reasons. This paper presents an integrative overview of movement improvisation research, identifying 18 processes that might account for changes in mental health outcomes and moderator and mediator variables that can influence the effects of such intervention. We propose that different movement forms engage these processes to varying degrees, resulting in contradictory outcomes in mental health. Our review highlights the need for a unified theoretical framework and standardized research methodologies to improve the comparability of studies on dance and movement. Future research should focus on meta-analyses and control studies to deepen the understanding of the effects of movement improvisation and its broader therapeutic applications.

Introduction

In recent years, psychology research has increasingly focused on interventions that incorporate various art forms. Movement improvisation aligns with this trend and is a key component of dance/movement therapy (DMT). In DMT therapists use body movement as an assessment tool and a mode of intervention ([American Dance Therapy Association](http://www.american-dance-therapy-association.org/)). In contrast, when movement improvisation is used in a non-therapeutic context, it primarily serves as a tool for the non-verbal communication of thoughts and emotions, as defined by [Blom and Chaplin \(1988\)](#). While the role of recreational movement improvisation is fundamentally different from that of movement improvisation in dance/movement therapy (DMT), the processes and mechanisms through which it exerts its effects may overlap significantly.

Numerous empirical studies have demonstrated the reliability and effectiveness of DMT, making it a relevant topic for scientific research (see [Cruz & Sabers, 1998](#); [Meekums et al., 2012](#); [Koch et al., 2013](#)). However, there is limited empirical research on movement improvisation itself, leaving much unknown about its psychological effects and potential for broader therapeutic application outside DMT. Due to the limited number of studies on movement improvisation, it is necessary to rely on research from the broader fields of movement and dance.

However, a meta-analysis on the effects of DMT and dance interventions on health-related psychological outcomes describes important limitations in this field such as inconsistent results – mainly due to methodological differences –, a limited number of meta-analyses and primary studies, aligning with our view ([Koch et al., 2014](#)). This lack of consistency is unsurprising, given the absence of standardized protocols for how an intervention should be conducted. Movement and dance classes can take various forms even within the same genre (e.g., hatha yoga, rumba, hip hop), resulting in each study essentially using a slightly different intervention. Thus, one possible explanation for the inconsistency in results is that not all forms of movement have the same effects (see for no improvement in depression: [Baptista et al., 2012](#); [Eyigor et al., 2009](#); see for improvement in depression: [Finn et al., 2023](#); [Pinniger et al., 2012](#); see for more detailed description: section “Effects of Moderators”). It is also difficult to compare results due to inconsistency in methodology and variable operationalization. Christensen and colleagues (2021) and [Koch et al. \(2014\)](#) also state that much of the inconsistency in results stems from the lack of unified definitions and how mental health is operationalized. These variations makes it challenging to compare and interpret the findings across studies and meta-analyses. While some meta-analyses provide valuable insights into the general effects of certain types of movement, these results must be

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interpreted cautiously due to the diversity of methodologies used – a limitation frequently mentioned by authors (see: Liu et al., 2023; Koch et al., 2014; Fleming & Herring, 2018).

For these reasons, we believe it is crucial to establish an integrated and unified theoretical framework that can serve as a foundation for researching movement improvisation. This would benefit the field of psychology related to dance and movement for three reasons: (1) This is necessary to enable the development of well-designed, comparable studies on the relationship between movement improvisation and mental health, whose results can be properly interpreted. (2) Such efforts would deepen our understanding of movement improvisation and enhance its practical application outside of DMT by harnessing its positive effects. (3) Last, but not least, understanding the independent effects of movement improvisation would bring us closer to understanding the specific (outside the independent effects of movement improvisation) and non-specific (the independent effects of movement improvisation) factors in DMT.

Our goal is not to create a new therapeutic method or examine the effects of DMT but rather to lay the groundwork for more precise examinations into movement improvisation and its potential non-therapeutic applications. The purpose of this integrative review is to summarize possible underlying processes of movement improvisation and provide a foundation for future research and interventions on movement improvisation – and potentially other dance and movement forms – in relation to mental health.

Defining the conceptual framework

Improvisation can be interpreted as a part of dance; however, the definition of dance is just as complex as that of improvisation. From an anthropological perspective, "dance is a cultural form that results from creative processes which manipulate human bodies in time and space" (Kaeppeler, 1978, p. 32). As Martha Graham famously said, "Dance is the hidden language of the soul, of the body" (Martha Graham Reflects on Her Art and a Life in Dance, 1985). Mackrell (2024) describes dance as "the movement of the body in a rhythmic way, usually to music and within a given space, for the purpose of expressing an idea or emotion, releasing energy, or simply taking delight in the movement itself" (Encyclopaedia Britannica). This definition aligns with Bakare's (2000) concept of dance as "a rhythmic movement of the human body in time and space to make statements" (Aluede & Eregare, 2006). However, (Jacqueline Smith 1989, In Aluede & Eregare, 2006) defines dance as an exposition of movements, notably omitting the rhythmic component. In Nigeria, some groups practice dancing without music, which highlights the independence of dance from rhythm (Aluede & Eregare, 2006). In addition to these broad definitions of dance, oversimplified descriptions can also be found, as Fitch and Barnstaple (2024) argue, such as "moving to music" or "moving to music with others." They define dance as mindful movement, referring to skilled, intentional movements that can be performed with or without others and with or without music.

Gueugnon and colleagues (2016) define improvisation in psychology as a creative process in which individuals produce something new without relying on pre-existing material (Gueugnon et al., 2016 In Coste et al., 2019). In contrast, Chelariu and colleagues (2002) conceptualize improvisation as the unique combination of pre-existing elements (in this case, specific movements) to reflect the present moment (Coste et al., 2019). (Steinsholt and Sommero 2006, In Bjorbaekmo & Engelsrud, 2011) offer another perspective, emphasizing that improvisation is a reflective practice where the body, movement, and environment exist in dynamic interaction. Sheets-Johnstone describes improvisation in dance as a way of thinking in movement, a seamless fusion of thought and action (Ravn & Høffding, 2021).

These diverse perspectives of dance and improvisation highlight the multifaceted nature of these concepts, each emphasizing different aspects of their essence. While these definitions effectively capture their complexity, the lack of a clear methodological framework makes it

challenging to define the boundaries of these concepts. This ambivalence complicates efforts to categorize the content of movement-based interventions, which is crucial for assessing the distinct effects of different components of movement improvisation.

Drawing on these, a significant challenge in the field of movement research is the precise interpretation of key concepts. The various definitions of movement, dance, and improvisation lead to less comparable results, as detailed descriptions of the interventions used are often lacking. Additionally, as we can see, these concepts can mean many different things. Think about the influence of hip-hop dance on mental health, as this genre can take many different forms (e.g., freestyle, choreography, background dance, theatrical dance) as well as the other types of movement. Similarly, ballroom dancing encompasses various distinct dance styles. Therefore, the impact of a movement intervention can only be accurately interpreted when the intervention itself is precisely described – something that is often lacking. Additionally, there are forms of movement such as dance aerobics, synchronized swimming, acrobatic rock and roll, and yoga, which occupy borderline areas in the traditional understanding of dance. From a research perspective, it is essential to establish a standardized definition of fundamental concepts, as this would also provide a clear framework for determining the types of tasks and movements to be included in interventions. We defined three basic concepts – movement, dance, and improvisation – based on the various approaches presented.

Movement and dance

Movement, is a broader term referring to any physical change in the position of the body relative to a fixed point. This encompasses activities such as dancing and running, as well as a wide range of other actions (e.g., walking, boxing, brushing teeth).

Dance is a form of physical movement that combines artistic elements, typically performed to music – although movement without music can also be considered dance – featuring defined and/or spontaneous mindful motions. It can involve one or more body parts, with movements that are either coordinated or disorganized, aestheticized or not, often utilizing specific rhythms to structure the motion. Dance can also be seen as a form of language, inherently communicative, though it lacks a universally identifiable, rule-based logic in the linguistic sense (Lynne-Hanna, 1979). Moreover, dance encompasses social, cultural, emotional, and cognitive dimensions, influencing an individual's psychological, physical, and biological states (Murcia et al., 2010; Christensen et al., 2021). This definition of dance is based on the works of Kaeppeler (1978), Aluede and Eregare (2006), Mackrell (2024), and Fitch and Barnstaple (2024).

For instance, running would not be classified as dance under this definition, as it lacks artistic components and communicative intent. However, synchronized swimming, certain forms of yoga, and acrobatic rock and roll do fall under the concept of dance – though this might seem unconventional – since in this context, dance is considered a theoretical concept rather than interpreted in its typical sense.

Improvisation

Movement improvisation falls within the broader concept of dance. It is a spontaneous form of motion in which a person shapes the sequence of movements based on momentary associations (Lovatt, 2018). This may include pre-existing, previously learned dance elements (e.g., turning combinations, basic hip-hop steps). However, during improvisation, the individual does not know what their next movement will be (Merritt 2015, as cited in Ravn & Høffding, 2022). In contrast, a dance routine or choreography involves a predetermined sequence of movements according to Oxford Languages Dictionary. Movement improvisation also incorporates everyday, natural, and specific movements, which are creatively used to express the present moment or process (Azzara & Grunow, 2010 In Coste et al., 2019). As a result, anyone can engage in this form of movement, adapting the intervention to their own abilities by incorporating their unique movements. For instance,

walking can be considered movement improvisation if the individual mindfully shapes the form, pace, and style of the walk to express a specific thought, feeling, or moment.

Movement improvisation can be divided into two categories. The first is goal-oriented improvisation (Wiedenhofer & Koch, 2017). In this case, movement arises from spontaneous associations but is guided by a specific concept (e.g., “Move as if you were a leaf blown by the wind!”). Therefore, it cannot be considered entirely free improvisation, as the movements must always connect to the given concept in some way. Here, movement becomes a manifestation of thought, with the improvisation continually linked to the mental representation of the idea. Unlike purely physical movements devoid of conscious thought, this form requires ongoing connection to the conceptual framework (Ravn & Høffding, 2022). The second category is non-goal-oriented improvisation (Wiedenhofer & Koch, 2017). Blom and Chaplin (1988), pp. x) describe dance improvisation as a process that “fuses creation with execution [...], it is thus creative movement of the moment [...] [where] the kinesthetic self is free to partner with the imagination impulsively, without preparation or preconception.” This form of improvisation is not tied to a specific thought or idea, but instead is characterized by mindfulness or flow, where movement is free from external direction.

Movement improvisation and mental health

Movement improvisation is not considered an independent genre; rather, it is present in various dance styles (e.g., contemporary dance, breakdance, ballroom dance, Hungarian folk dance), certain martial arts (e.g., qigong, tai chi), and other forms of movement (e.g., yoga). Despite the widespread application of DMT, the definition of movement improvisation varies as we presented above. This lack of unified definition presents a challenge for improvisation-related research. Where should one begin in terms of literature? DMT involve multiple factors that can alter the effects of movement, either amplifying or shifting them in a different direction. As a result, research outcomes typically reflect the impact of the overall therapeutic method rather than the specific effects of movement improvisation. Conversely, basing research on improvisation within a specific dance genre may limit generalizability, as the unique characteristics of that genre can skew findings. Additionally, there is limited research specifically focused on movement improvisation alone, and the studies available can differ significantly in terms of the intervention used due to a lack of unified definition and method. Thus, it is important to consider findings from research on different dance genres, movement forms, and sports to distinguish the effects of the underlying processes of movement. In the following paragraphs, we present articles whose interventions align with the definition of movement improvisation and dance provided above.

The field of dance psychology research has experienced significant growth in recent years. However, the empirical investigation of dance or movement improvisation in relation to mental health remains a relatively developing area. Kim and Kim (2007) examined the effects of hip-hop improvisation on well-being. They found that after one session, participants in the hip-hop improvisation and aerobic groups experienced improvements in well-being, whereas no such improvements were observed in the body conditioning or ice-skating groups. The lack of detailed descriptions of the interventions in this case limits the ability to draw conclusions about why only hip-hop improvisation and aerobics yielded these positive outcomes, leaving us with questions regarding the underlying processes of these forms of movement.

Wiedenhofer and Koch (2017) conducted a pivotal study comparing the effects of goal-oriented and non-goal-oriented dance improvisation on perceived stress, general self-efficacy, body self-efficacy, and well-being. They found that all variables improved in both groups after a single session, with the exception of body self-efficacy, which did not improve in the goal-oriented group. A notable strength of this study is the authors' detailed description of the intervention. However, integrating the results into a broader theoretical framework would help

interpret why body self-efficacy did not improve when participants were presented with concepts to connect to during improvisation.

Dame and colleagues (2022) investigated the effects of an Emotional Availability (EA)-based dance intervention designed for pregnant women. This pilot study included two 90-minute online dance improvisation sessions, either alone or combined with psychoeducation, alongside a control group. Results indicated that anxiety and prenatal emotional availability improved in the intervention groups. Furthermore, depressive symptoms improved more significantly in the dance improvisation group compared to the control group. The detailed explanation of the intervention and the use of control groups provide valuable insights into the mechanisms underlying these outcomes. Additionally, the online delivery format of this study is noteworthy, as it removed the social component typically associated with such interventions. However, the lack of deeper interpretation of the differences between the groups raises further questions.

Bracco et al. (2023) explored the effects of tango therapy on well-being and quality of life, as well as intervention attendance, physical abilities, walking performance, and functional capacities in older adults (aged 78 years or older) with cognitive impairments. After 12 weeks and 24 sessions of dance intervention, they observed a significant improvement in quality of life. The detailed description of the intervention is a strength of this study, as it could help us better understand the mechanisms of movement improvisation. However, the same issue arises as before.

Research on movement improvisation and mental health is diverse in terms of sample characteristics, intervention content, and study duration. Despite this variability, the findings are promising, suggesting that this form of dance can be beneficial for mental health across different stages and aspects of life. However, without a unified theoretical framework, a deeper interpretation of the results is challenging.

How do dance and movement exert their effects?

Describing the underlying mechanisms of dance and movement is not new in this research field. As Merényi (2004) summarizes, DMT is grounded in the connection between body and mind, supported by neuroscientific research on implicit memory. It integrates psychoanalytic theories, particularly modern self-psychology, alongside experiences from contemporary dance and body-awareness systems. Psychoanalytic theories highlight the importance of infancy in shaping future relationships. Stern posits that infants' self-experience is bodily rather than verbal, which influences behavior unconsciously later in life (Stern, 2003 In Merényi, 2004). Movement in DMT allows participants to access unconscious memories, repressed conflicts, or early experiences that are difficult to verbalize. In infancy, explicit memory systems are underdeveloped, so early relational and emotional experiences are stored in implicit memory. These unconscious experiences can be reshaped through practice and experience. DMT thus facilitates reflection on behaviors and also addresses implicit experiences that cannot be articulated through words.

We can find other models as well explaining how dance and movement exert their effects. The Mental Health Through Sport Model (Eather et al., 2023) was developed with a purpose similar to the present work, outlining the processes of sport in relation to physical activity and social relationships. Another relevant framework is the Dance Motivation Inventory (DMI), created by Maraz and colleagues (2015), which captures the motivational aspects of dance. In developing our theoretical model, we took both of these frameworks into account. Moreover, beyond understanding why people move and how movement impacts mental health, the nature of the movement itself warrants deeper exploration. Laban Movement Analysis breaks down the process into its core elements and can be used to explore the specific characteristics of an individual's movement. Additionally, Giurchescu (2001) and Butterworth (2012) identified nine levels of movement analysis, referred to as the semiotic levels of dance, which provide a detailed framework for

examining the communicative aspects of dance.

The theories and ideas introduced above are very useful for understanding how dance and movement exert their effects. However, none of them are suitable for describing the mechanism of movement improvisation in a way that would facilitate the conduction of comparable and generalizable research in this field. To explain the inconsistencies in the findings mentioned in the section "Effects of Moderators" and to lay the groundwork for a deeper interpretation of the results and future research, we began to sketch out a theory capable of addressing these issues.

Our own experiences as hip-hop and modern dance instructors partially explain this phenomenon. Dancers may experience a range of emotions after classes – feeling delighted, stress-relieved, and confident after one session, yet sad, emotionally unsettled, or frustrated after another. They might also feel ambivalent, experiencing both positive and negative emotions simultaneously. This experience drew our attention to the importance of the components of the intervention (e.g., the music used, level of difficulty) and other influential factors (e.g., dancers' preferences, their psychological state). When researching therapy, an important question is which factors and processes lead to the desired outcomes. Yalom identifies 11 common therapeutic factors that contribute to the effects of therapy (Yalom, 1995 In [Witte et al., 2021](#)). [Imus and Young \(2023\)](#) describe nine fundamental mechanisms in creative arts therapies. The concept that interventions contain various factors, components, or mechanism is not new. However, there is no comprehensive description of these processes in movement improvisation. We believe that this form of movement also involves distinct processes through which the intervention exerts its effects. To empirically examine this theoretical idea, we reviewed the literature on movement and dance, focusing on the processes identified by researchers and participants that they believe contributed to changes, or by ourselves by the interpretation of results in mental health outcomes. To empirically examine this theoretical idea, we reviewed the literature on movement and dance, focusing on the processes identified by researchers and participants, as well as the processes we concluded from our interpretation of the results.

Research question

From a broad perspective, this review examines the processes, moderators and mediators underlying movement interventions to explain the mechanism of the effect of movement improvisation and establish a unified theoretical and methodological foundation for future movement research. Specifically, we explore how movement improvisation exerts its effects in non-therapeutic settings and the factors influencing these effects. In summary, our research question is: What are the potential underlying processes, moderators and mediators through which movement improvisation exerts its effects?

Methods

As discussed in the introduction, due to the limited number of studies specifically focused on movement improvisation and mental health, we reviewed literature on various forms of movement. These include dance improvisation across genres (e.g., hip hop, contemporary, ballroom), music improvisation with parallels to movement improvisation, and individual or team sports (e.g., basketball, Pilates, yoga) that share common features. To identify processes potentially underlying movement improvisation, we considered diverse movement domains, guided by the definitions of core concepts provided earlier. These definitions helped identify components associated with other movement forms relevant to movement improvisation, highlighting shared features across various types of movement.

Search strategy

For this article, we conducted an integrative literature review. Relevant articles published between 1995 and 2023 were identified using Google Scholar. In addition, we performed a manual search of reference lists from these articles and key journals related to dance and movement in psychology, including "The Arts in Psychotherapy", "American Journal of Dance Therapy", and "Arts & Health". The following keywords were used in order to find eligible results: "dance", "dance intervention", "hip hop dance", "modern dance", "contemporary dance", "movement improvisation", "improvisation" with additional search terms "and mental health". Only studies that met the following criteria were included:

- The article examines the connection between mental health and improvisation, dance, or movement.
- The article discusses or the results suggest potential underlying processes of the researched movement.

Defining processes and mechanism

In creative arts therapies a set of 'common factors' are understood to promote change through therapy (Ahessy, 2013 In [Dunphy et al., 2019](#)). These factors are common to all types of psychotherapy, they are not approach-specific (Kazdin, 2009 In [De Witte et al., 2021](#)). However it is difficult to interpret these factors to a non-therapeutic setting. In line with this definition, we define factors that may be common to all movement interventions as "processes." In our implementation, a process refers to a construct (e.g., flow, self-expression), a variable (e.g., physiological indicators, psychological states), or a method (e.g., mindfulness, journaling) that has a distinct, measurable effect contributing to overall changes in the studied variables and is a part of the movement intervention.

[De Witte et al. \(2021\)](#) define mechanism of change in the topic of therapy as „A theory-driven causal chain or sequence of events or processes (or mediating variables) that explain, in greater detail than factors or mediators alone, how or why therapeutic change occurs" ([De Witte et al., 2021](#), pp. 4). To understand the underlying mechanism of movement improvisation, we first need to understand the relationship between the described processes.

A moderator in [De Witte et al. \(2021\)](#) definition is „a variable external to the treatment that influences the direction or magnitude of the statistical relationship between the treatment and outcome, such that a moderator may strengthen, weaken, diminish, or reverse the relationship between X and Y" ([De Witte et al., 2021](#), pp. 4).

A mediator in their definition is „an intervening variable that is theorized to account for the statistical causal relationship between two variables, such that X causes M which in turn causes Y. A mediator clarifies how or why therapy leads to change and is a term usually used in the context of quantitative statistical analysis" ([De Witte et al., 2021](#), pp. 4). We interpreted mediators as characteristics of the intervention that influence which processes may prevail. Specifically, in our case, a mediator is a variable theorized to account for the relationship between movement improvisation and mental health, such that if movement improvisation incorporates the mediator, it enables a specific effect of a process to emerge.

Data and content extraction

After screening the titles and abstracts, two researchers independently assessed the full-text articles for relevance. Disagreements were resolved through discussion. Relevant data and content were extracted from the selected articles, and a table was created to summarize key characteristics, including research design, measures, results and the possible underlying processes, moderators and mediators discussed (see [Table 1](#)).

Table 1
Reviewed articles.

Author	Design and sample	Subject and intervention	Measures	Results	Possible processes*	Possible moderators and mediators*
Adam et al., (2016)	intervention study, RCT, longitudinal design (assessment points: baseline and after 3 and 6 weeks), $n_{\text{int}} = 44$ $n_{\text{cont}} = 40$ age 60 or older, mild to moderate cognitive impairment	poco-poco dance and relaxation total of 12 sessions, 2 sessions (60 minutes/session) per week for 6 weeks Intervention group: 10-minute warm-up, 20 minutes of poco-poco dancing (stepping movements with progressively more intense arm and leg movements), 10-minute cool-down, 30-minute relaxation Control group: 40-minute relaxation (relaxing music, deep breathing, visualizing, progressive muscle relaxation 3-times) team sports	Mini-Mental State Examination Hospital Anxiety and Depression Scale (HADS) Quality of Life in Alzheimer's Disease (QOL-AD) questionnaire	Anxiety, depression, cognitive impairment and QoL significantly improved in the intervention group. The intervention group was more effective than the control group. Anxiety and depression increased, QoL decreased in the control group.	Based on study: (1) relaxation combined with dance, (2) coping, (3) cognitive and physical improvements, (4) music Based on our model: stress management methods (1), coping and emotion-regulation (2), general psychological changes/physiological changes (3), music (4)	Based on study: (5) age Based on our model: demographics (5), music (4)
Andersen et al., (2018)	integrative literature review 17 studies			Participation in team sport is associated with improved social and psychological health independent of the type of team sport, age, or somatic or mental health problems. Team sport could be more efficient in promoting health and ensuring adherence than individual sport, because it offers a social setting, playfulness, structure in everyday life and enjoyment.	Based on study: (1) adherence, (2) social setting (inclusivity, play, social interaction), (3) enjoyment, (4) meaningfulness/structure in everyday life Based on our model: general psychological changes (1, 3, 4), social environment and relationships (2)	Based on study: (5) initial psychological state, (6) motivation, (7) social context Based on our model: initial psychological state (5), level of involvement and motivation (6), social context (7)
Bräuninger, (2014)	intervention study, RCT, longitudinal (assessment points: mental health measures at pre- and post-test and at six months follow-up, intervention checklists after each session) $n_{\text{therapists}} = 11$ $n_{\text{int}} = 97$ $n_{\text{cont}} = 65$ participants suffered from stress	DMT total of 10 sessions, 1 session (90 minutes/session) per week for 10 weeks (each of 11 DMT therapists led 10 group sessions in distinct groups) Intervention group: DMT, where the therapists could choose eclectically from four DMT approaches and 10 DMT interventions Control group: wait-list	Intervention Checklist 1 (individual interventions used by therapists) Intervention Checklist 2 (group approaches used by therapists) Brief symptom inventory (BSI) Coping and stress questionnaire (SVF 120) World Health Organization QOL questionnaire (WHOQOL-100) Munich life dimension list (MLDL)	Dance Improvisation, Spatial Synchrony, Synchrony in Effort and Focusing are important individual DMT interventions that enhance clients' Daily Life and decrease Somatization symptoms. Different interventions and approaches result in different outcomes in mental health.	Based on study: Chace approach, Psychodynamic Oriented Dance Therapy, Authentic Movement, Integrative Dance Therapy, (1) dance techniques (improvisation, choreography, composition, stage presence), (2) DMT techniques (expression, metaphors, synchrony), (3) focusing, (4) imaginative techniques, (5) leadership styles, (6) non-DMT techniques (painting, writing, theater), (7) relaxation techniques, (8) session structuring Based on our model: self-expression/synchrony with each other (2), stress management methods (7), other psychological methods (3, 4), non-movement techniques (6) Based on study: (1) focus attention/induced flow, (2) basic emotional experiences,	Based on study: - Based on our model: intervention characteristics (1, 5, 8)
Christensen et al., (2017)	integrative literature review	dance (neuroscientific and biobehavioral evidence)		Dance is beneficial and important for the stability of human social, cognitive, and		Based on study: (7) goal- and non goal-oriented movement Based on our model:

(continued on next page)

Table 1 (continued)

Author	Design and sample	Subject and intervention	Measures	Results	Possible processes*	Possible moderators and mediators*
				neurobiological systems. Six functions of human dance have been proposed: focus attention, induced flow, basic emotional experiences, imagery, communication, self-intimiation and social cohesion.	(3) imagery, (4) communication, (5) self-intimiation, (6) social cohesion, (7) observing others while moving Based on our model: altered states of consciousness (1), general psychological changes (2, 5), other psychological methods (3), self-expression/ social environment and relationships (4), social environment and relationships (6), observing others while moving (7)	social context (4), characteristics of intervention (7)
Duberg et al., (2016)	intervention study, RCT $n_{int} = 59$ $n_{cont} = 53$ $n_{interview} = 24$ adolescent girls with internalizing problems	dance total of 64 sessions, 2 sessions (75 minutes/ session) per week for 32 weeks Intervention: 15 minutes warmup, 40 minutes dance practice (choreography, improvisation), 15 minutes of relaxation (including a light massage in pairs) and 5 minutes reflection. The participants had the opportunity to choose music and dance styles. Optionally participants were offered to journal their experiences during the intervention. The diary would neither be collected nor read by anyone. Control group: not mentioned	Semi-structured interview (35–90 minutes) The interviews were based on open-ended questions from an interview guide.	The first category An Oasis from Stress was described as a fundamental basis for participation, together with Supportive Togetherness, that represents the important group setting. As this was ensured, the girls could engage in the immediate effect of the dance, Enjoyment and Empowerment, and experience the outcome, Finding Acceptance and Trust in Own Ability, and, moreover, the ability to use Dance as Emotional Expression. These experiences gave rise to the main category, Finding Embodied Self- Trust That Opens New Doors.	Based on study: (1) An Oasis from Stress, (2) Supportive Togetherness, (3) Enjoyment and Empowerment, (4) Finding Acceptance and Trust in Own Ability, (5) Dance as Emotional Expression Based on our model: stress management methods (1), social environment and relationships (2), general psychological changes (3, 4), self-expression (5)	Based on study: (6) social context Based on our model: social context (6)
Eather et al., (2023)	systematic review 29 studies	sports		Participation in sport (community and elite) is related to better mental health (e.g., higher self-esteem, life satisfaction, reduced levels of depression, anxiety, and stress), and improved social outcomes (e.g., improved self-control, prosocial behavior, interpersonal communication). Participating in team sport had more favorable health outcomes than those participating in individual sport. Adults in elite sport may experience higher levels of psychological distress.	Based on study: (1) neurobiological mechanisms, (2) psychosocial mechanisms, (3) behavioural mechanisms, (4) social connections and support (social support, belonging and companionship, self-control or mastery, social influence and comparison, behavioural guidance, purpose and meaning, social control, self-esteem) Based on our model: physiological changes (1), general psychological changes (2), behavioural processes (3), social environment and relationships (4)	Based on study: (5) level of competition, (6) social context, (7) age, (8) sport type, (9) sport context, (10) intensity, (11) frequency, (12) duration, Based on our model: level of involvement and motivation (5), social context (6), demographics (7), intervention characteristics (8, 9, 10, 11, 12)
García-Díaz, (2018)	intervention study, RCT, pre- and post-test	authentic movement 1 session (7 minutes/ session)	Positive and Negative Affect Schedule (PANAS)	Intervention group: Anxiety and happiness decreased statistically	Based on study: (1) awareness of inhibited emotions, (2) body	Based on study: (4) previous experience, (5) trait affect

(continued on next page)

Table 1 (continued)

Author	Design and sample	Subject and intervention	Measures	Results	Possible processes*	Possible moderators and mediators*
	$n_{\text{int}} = 28$ $n_{\text{cont}} = 29$	Intervention group: The subject was placed standing barefoot on a parquet surface, eyes closed. The following instructions were given: “When you hear the sound of a bell, you should focus on the physical sensations that you are experiencing. Then, you must enable these physical sensations to be transformed into motion, following in this way the momentum arising from the body. Speaking is not allowed, although making sounds is allowed (e.g. screaming, laughing, etc.). There is no need to remember or memorize the movements being made”. Control group: Same conditions but the participants had to memorize what they were doing. Movement was followed by a 30 minutes long debrief. The researcher was always present as a witness.	Mood Evaluation Scale (Escala de Valoración del Estado de Ánimo, EVEA)	significantly. Melancholy and sadness increased (not statistically significant). Reductions were observed in nervousness, tension, and restlessness. Trait affect influenced results. Control group: There were no significant changes at the subscale level. A statistically significant increase in irritation, annoyance, and sadness was noted.	awareness, (3) reducing perceived control Based on our model: general psychological changes (1, 2, 3)	Based on our model: experience (4), trait characteristics (5)
Han et al., 2018	literature review sample not mentioned	music familiarity and preference		Familiar music is effective in creating a safe environment and elicit past memories. Preferred music is used to encourage participation and improve mood. A client preferred genre is more effective than preferred specific songs.	Based on study: (1) music Based on our model: music (1)	Based on study: (1) music Based on our model: music (1)
Haynes et al., (2023)	intervention study, realist evaluation approach $n_{\text{dance}} = 77$ $n_{\text{survey}} = 62$ $n_{\text{interview}} = 51$	dance Participants completed six RIPE dance classes, than a part of them completed a survey to evaluate the RIPE Dance program and a part of this smaller group completed an interview for the same purpose.	survey (developed by authors to evaluate the RIPE dance program) semi-structured interview (to evaluate the RIPE dance program)	Researchers found the following factors that contribute to long-term attendance at dance classes: trusting that the intervention is “right for me”, belief/experience of health benefits, self-efficacy, pride in achievement, psychological safety, defying expectations, feeling valued, social connection, mutual support, rapport with the teacher, raised spirits, fun, synchrony and musical reactivity.	Based on study: (1) trusting that the intervention is “right for me”, (2) belief/experience of health benefits, (3) self-efficacy, (4) pride in achievement, (5) psychological safety, (6) defying expectations, (7) feeling valued, (8) social connection, (9) mutual support, (10) rapport with the teacher, (11) raised spirits, (12) fun, (13) synchrony, (14) musical reactivity Based on our model: general psychological changes (3, 4, 5, 6, 7, 8, 12), social environment and relationships (8, 9, 10), synchrony with	Based on study: - Based on our model: beliefs (1, 2)

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Table 1 (continued)

Author	Design and sample	Subject and intervention	Measures	Results	Possible processes*	Possible moderators and mediators*
Jeong et al. (2009)	intervention study, RCT, longitudinal (assessment points: pre- and post-intervention) $n_{\text{int}} = 20$ $n_{\text{cont}} = 20$ adolescents with mild depression	DMT Total of 36 sessions, 3 sessions (45 minutes/sessions) per week for 12 weeks Intervention group: DMT designed around four major themes: awareness of the body, the room, and the group; movement expressions and symbolic quality of movement; movement, feeling, images, and words; and differentiation and integration of feelings. Each of these themes included sub-themes. Control group: Did not participate in the intervention.	Symptom Check List–90-Revised (SCL–90-R) Plasma serotonin and dopamine concentrations	Intervention group: significant improvements in negative psychological symptoms (somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism), modulated serotonin and dopamine concentrations DMT has relaxation effects, stabilizes the sympathetic nervous system, and may be beneficial in improving the symptoms of mild depression.	each other/synchrony with music (13, 14) Based on study: (1) changes in concentration of stress hormones, (2) muscle relaxation Based on our model: physiological changes (1, 2)	Based on study: - Based on our model: -
Krantz & Pennebaker, (1995)	intervention study, RCT, longitudinal design (assessment points: pre-, during, post- and 10 weeks after intervention), $n = 64$	dance improvisation 3 sessions (10 minutes/session) Condition 1: move their bodies in order to express their feelings and thoughts about a personally significant issue or traumatic experience Condition 2: move to express their feelings and thoughts about a personally significant issue or traumatic experience and then write about what they expressed Control group:: execute a non-expressive exercise task Participants moved alone in a private room. Last session was videotaped.	Omran Digital Blood Pressure Monitor (blood pressure, heart rate) Judging subject's degree of expressiveness Number of illness visits in the Student Health Center Questionnaire about own performance Symptom checklist (developed by authors) Grade point average Long-Term Questionnaire (developed by authors)	Participants improved in expressing their thoughts and feelings through movement (condition 1 and 2). Participants in condition 1 and 2 reported that their movement was more personal, positive, valuable, and emotion-eliciting compared to condition 3. In condition 1 participants increased their rates of expressiveness in movement. Only participants in condition 2 showed significant improvement in GPA and physical health. The writing about the traumas appeared to completely overtake the importance of movement and self-expression in movement. 10 weeks after the intervention participants evaluated the experiment as difficult but beneficial, valuable and thought provoking.	Based on study: (1) self-expression, (2) emotion-eliciting, (3) evokes positive emotions, (4) writing Based on our model: self-expression and -intimation (1), general psychological changes (2, 3), non-movement techniques (4)	Based on study: - Based on our model: -
Dobay et al., (2019)	intervention study $n = 11$ secondary school students	dance improvisation total of 5 sessions, 1 session (45 minutes/session) per week for 5 weeks Intervention: Verbal opening circle, short body awareness work (improvisation), relationship work (improvisation) based on this and movement creation. At the end verbal processing. In addition, creative dance, dance and movement	interview (with group leaders and students)	The intervention offered as an opportunity for students to get to know themselves and each other. The level of cooperation and involvement is largely determined by attention and motivation for practice. If we move from concrete games and exercises to more abstract movement improvisations, it helps both involvement and reflective thinking and processing and thus will	Based on study: - Based on our model: -	Based on study: (1) attention and motivation, (2) structure of session Based on our model: initial psychological stat/level of involvement and motivation (1), intervention characteristics (2)

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Table 1 (continued)

Author	Design and sample	Subject and intervention	Measures	Results	Possible processes*	Possible moderators and mediators*
Lane & Lovejoy, (2001)	intervention study, RCT $n_{\text{int}} = 28$ $n_{\text{cont}} = 52$ intervention group: depressed mood control group: no-depression group experience in aerobic dance	improvisation, drama pedagogy and contact improvisation. aerobic exercise 1 session (60 minutes) Intervention: Warm-up (dance steps, walking, stretching), main session (stepping, lunges, knee lifts, bicep-curls, dance steps), and cool-down (stretching, breathing). In the session participants followed the moves of the instructor. The same music was used to accompany each aerobics session.	24-Item Profile of Mood States-Adolescents (POMS-A)	have a developmental impact on self-reflectivity and thus self-knowledge. Exercise influences mood positively regardless of depressed mood. The depressed mood group reported significantly greater mood changes. The depressed mood group reported significantly higher anger, confusion, fatigue, tension, with reduced vigor.	Based on study: (1) exercise Based on our model: physiological changes (1)	Based on study: (2) mood before the intervention Based on our model: initial psychological state (2)
MacDonald & Wilson, (2014)	literature review 177 studies	musical improvisation		Improvements were found in psychomotor impairments in patients recovering from neurological damage. Benefits for mental health included increase of vigour, reduction of tension, stress or anxiety, improving the symptoms of depressed patients (guilt, shame, despair) and enhanced self-esteem, self-confidence, self-awareness or emotional wellbeing. Those with low motivation are identified as more likely to benefit from different interventions. It can improve communication skills, joint attention, emotional communication, social interaction and self-expression. It can also improve emotional lability, psychosomatic symptoms, motor and timing skills.	Based on study: (1) self-expression, (2) unconscious expression, (3) creative expression, (4) creative social interaction, (5) emotional expression Based on our model: self-expression (1, 2, 5), social environment and relationships (4)	Based on study: (6) motivation Based on our model: level of involvement and motivation (6)
Maraz et al., (2015)	survey study, development of the Dance Motivation Inventory $n = 447$ recreational latin dancers	latin dance	systematic literature review self-report survey („I dance because...")	Categories of motivation to dance: fitness, mood enhancement, intimacy, socializing, trance, mastery, self-confidence, escapism	Based on study: (1) fitness, (2) mood enhancement, (3) intimacy, (4) socializing, (5) trance, (6) mastery, (7) self-confidence, (8) escapism Based on our model: physiological changes (1), general psychological changes (2, 6), intimacy (3), social environment and relationships (4), altered states of consciousness (5), coping and emotion-regulation (8)	Based on study: - Based on our model: -
Murrock et al., (2009)	intervention study, RCT, longitudinal (assessment points: pre- and post-intervention)	dance choreography total of 24 sessions, 2 sessions (60 minutes/session) per week for 12 weeks	interview (focus group) diabetes outcomes (A1C, weight, body fat, BP)	There were positive significant changes in the intervention group in systolic BP and body fat.	Based on study: (1) changes in BP and body fat, (2) attendance, (3) peer support Based on our model:	Based on study: - Based on our model: adherence and attendance (2)

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Table 1 (continued)

Author	Design and sample	Subject and intervention	Measures	Results	Possible processes*	Possible moderators and mediators*
	n _{int} = 34 n _{cont} = 36 type 2 diabetes mellitus African American women	Intervention group: Sessions consisted of 5 minutes of warm-up, 45 minutes of dance, and 10 minutes of cool-down. The instructor choreographed to gospel music selected by the women. The dance steps were easy to learn and master and the same gospel music and dance routines were used at each dance class. The instructor used self-limiting progressive intensity. Control group: usual care		Dancing may be an effective strategy to help those with diabetes to become more physically active and improve diabetes outcomes and overall health through adherence. Peer support was experienced as camaraderie, enjoyment, and laughter, which fostered attendance.	physiological changes (1), social environment and relationships (3)	
Sensui et al., (2016)	intervention study, RCT, longitudinal (assessment points: pre- and post-test) n = 22 intervention group = 11 control group = 11	hip hop dance total of 9 classes, 3 sessions (60 minutes/session) for 3 weeks Intervention group: hip-hop dance Control group: no intervention	event-related fMRI Mood Check List (MCL-S.2)	Intervention increased brain activity in the posterior parietal and occipital cortices, for both the pleasant and unpleasant emotional stimuli. Increased activity was observed in the temporoparietal junction (TPJ) and insula specifically for pleasant emotional stimuli. Through movement, empathic ability can increase, and the recognition of physical emotion expression and attention to emotionally salient stimuli can develop.	Based on study: (1) enhanced visual attention, (2) empathy and emotional understanding, (3) mirror systems activation, (4) bodily emotion processing, (5) regulation of emotional states Based on our model: physiological changes (1), social environment and relationships (2, 4), coping and emotion-regulation (5), physiological changes (3)	Based on study: - Based on our model: -
Pereira et al., (2021)	Systematic review 58 studies	recreational running		Intrinsic motives for running: health orientation, personal goal achievement, self-esteem, life coping, and life meaning, coping mechanism Extrinsic motives for running: contact with nature, adventure, competition, goal achievement, recognition, social motives Motives, pride, gain, flow and vigor predict running participation. Age influences running participation. Ability, beliefs, attitudes, norms, perceived behavior control, self-efficacy, previous behavior, action planning, action control and intention positively predicted running participation. Failing to translate physical activity into behaviour can be explained by explicit trait self-control, implicit executive functions, and their interactions. Running has significant	Based on study: (1) self-efficacy, (2) thermogenic effect, (3) hormonal response, (4) neurobiological changes, (5) natural environment, (6) participation, (22) psychological benefits Based on our model: general psychological changes (1, 17, 22), physiological changes/PNI changes (3, 4), environment (5), altered states of consciousness (16)	Based on study: (7) motivation, (8) age, (9) gender, (10) experience, (11) self-regulation, (12) environment, (13) social support, (14) frequency and duration, (15) pride, (16) flow, (17) vigor, (18) ability and perceived control, (19) beliefs, attitudes and norms, (20) trait self control, (21) executive functions Based on our model: level of involvement and motivation (7), demographics (8, 9), experience (10), initial psychological state (11, 15, 18, 21), physical characteristics (18), other moderators (12), intervention characteristics (14), social context (13), beliefs (19), trait characteristics (20), adherence and attendance (6)

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Table 1 (continued)

Author	Design and sample	Subject and intervention	Measures	Results	Possible processes*	Possible moderators and mediators*
Pinniger et al., (2012)	intervention study, RCT, longitudinal (assessment points: pre- and post-intervention) tango dance: n = 33 meditation: n = 33 waiting-list control: n = 31	tango and meditation total of 6 sessions, 1 session (90 minutes/ session) per week for 6 weeks 10 minutes: placing the emphasis on enjoying the experience 10 minutes: low-intensity stretching 1 hour class 10 minutes: wrap-up (sharing experience) Tango group: argentinean close-embrace tradition, focused on different aspects of the dance (consciousness of walking, awareness of one's own and partner's body, resistance and transference of weight, close embrace) Meditation group: mindfulness exercises (breathing, eating, body scan, walking meditation, music meditation) Control group: wait-list	Demographic survey (engagement in physical activity over the past month and how often) DASS–21 Scale Satisfaction with Life Scale Rosenberg Self Esteem Scale Mindful Attention Awareness Scale	psychological benefits, including improved mood, reduced depression, anxiety, stress, and fatigue, and increased vigor and well-being. Tango and meditation participants did show greater reductions in levels of depression compared to controls. Meditation was just as effective in decreasing depression as tango dance. Tango participants reported significant reductions in stress levels compared to meditation and wait-list controls. Dynamic physical activities may be more effective in reducing psychological stress than static activities such as mindfulness meditation. Tango and meditation was not effective in improving anxiety. It is possible that, receiving attention and correspondence during the program, as well as the prospective free lessons afterwards, may have positively influenced the responses of the control group, since their anxiety decreased. The tango group reported greater increase in mindfulness at post-test.	Based on study: (1) mindfulness, (2) physical activity, (3) attention and correspondance, (4) music Based on our model: stress management methods (1), physiological changes (2), music	Based on study: - Based on our model: initial psychological state (3)
Wookey, (2023)	systematic review 20 studies	movement-oriented mind-body interventions (yoga, trauma-sensitive yoga, qi gong, tai chi, and dance movement therapy): Interventions involving physical activity as the core emphasis, characterized by their use of movement activities with a focus on bodily experiences.		14 of the 20 included studies reported significant results in objective physiological PNI measures after the interventions. Reducing inflammation (i.e., IL–6, CRP, TNF-alpha), stress hormones (i.e., cortisol), and improving immune function (i.e., natural killer t cells) lead to improvements in overall physical and mental health, and reduction of infectious disease. Mind-body interventions reduced inflammation in participants after the interventions of yoga, qigong, and tai chi.	Based on study: (1) reducing inflammation (i.e., IL–6, CRP, TNF-alpha), stress hormones (i.e., cortisol), and improving immune function Based on our model: PNI changes (1)	Based on study: - Based on our model: -

Note. *Possible processes = based on study (processes explained or examined in the study through which movement/improvisation can exert its effects) and based on our model (how we incorporated these processes into our model), *possible moderators and mediators = based on study (moderator and mediator variables explained or examined in the study which influence the effects of movement/improvisation) and based on our model (how we incorporated these moderators and mediators into our model), DMT = Dance/Movement Therapy, PNI = psychoneuroimmunological, BP = blood pressure.

Results

Out of all 114 publications, we identified 20 articles explaining possible underlying processes, moderators and mediators relevant to movement improvisation. The main reasons for the exclusion of studies from this integrative review were the lack of description of possible underlying factors and the inability to interpret results in relation to them.

In this review, 12 intervention studies, seven review articles, and one questionnaire development study were included. Across these articles, the authors identified 91 processes and 34 moderators and mediators, which were categorized into 18 process and 10 moderator and mediator categories. An additional process and 3 moderators were supplemented, resulting in 19 process, 7 moderator and 3 mediator categories with further specified elements. The articles varied in their conceptualization of processes – some referred to them as mechanisms or factors, while others described them as possible explanations without explicitly naming them as underlying processes. Furthermore, there was some overlap in the identified concepts (e.g., music as an underlying mechanism appeared in three articles: [Pinniger et al., 2012](#); [Han, 2018](#); [Adam et al., 2016](#)).

The studies employed diverse methodologies, with both quantitative and qualitative approaches included. Seven quantitative intervention studies were all randomized controlled trials. Among the other five intervention studies, three used qualitative interview techniques, and two employed a mixed-methods approach. This methodological diversity is beneficial for exploring the complexity of underlying processes, moderator and mediator variables, as distinct approaches are needed to fully understand these factors. While review articles provided important thematic implications, some authors noted that

methodological diversity within a subject posed challenges for interpreting results. One study specifically aimed to develop a questionnaire to examine motivations for dancing.

Aligning with our aims we reviewed studies on dance and movement to gather already researched and described processes, moderators and mediators relevant to movement improvisation (see [Table 1](#)). These factors were found as results of qualitative and quantitative studies supplemented with with factors based on our practical experiences. Firstly, we summarize the processes, moderators and mediators identified (see section *Processes, Moderators and Mediators of Movement Improvisation*), and then elaborate on the empirical evidence supporting the importance and relevance of these variables in movement research (see section *Empirical Evidence Supporting the Theory's Components*). Finally, we summarize our findings and propose a hypothetical model to describe the mechanism of movement improvisation.

Processes, moderators and mediators of movement improvisation

The scientific examination of interventions is always a challenging task, as it involves drawing general conclusions about the simultaneous and interacting effects of multiple factors. Movement interventions are no exception, with numerous variables influencing their outcomes. Even if we conduct a dance session with the same participants at two different times, following an identical protocol, individual characteristics – such as mood and physical condition – can still alter the results. While it may not be possible to control all variables within a single study, it is essential to account for as many relevant aspects as possible during the design, keeping the research question and hypotheses in mind.

As we mentioned earlier, the idea that an intervention has multiple factors, mechanisms, mediators, and moderators underlying its effects is not new in the field of therapy research. [Greenberg \(1986\)](#) describes change process research, a method developed to understand the process of change in psychotherapy. According to Greenberg, therapy operates through several different mechanisms to exert its effects and emphasizes that client behaviors also contribute to the effects of therapy. Thus, different interventions may be effective for different client states and contexts. This aligns with our practical experiences mentioned in the introduction and could provide a possible explanation for the inconsistency in results within movement research. We applied this perspective to a non-therapeutic setting, gathering processes and moderator variables underlying the effects of movement on mental health relevant to movement improvisation.

The foundation of our theoretical model is depicted in [Fig. 2](#), which illustrates the fundamental relationship between the processes, moderators and mediators of movement and mental health. The core of our theory posits that movement influences mental health through specific processes based on [Greenberg's \(1986\)](#) idea. These effects can be influenced by additional factors, called moderators and mediators. This creates a multifactorial system – a mechanism – in which the various processes of movement interact and influence one another, collectively shaping mental health outcomes. We propose that different forms of movement (e.g., movement improvisation, Latin dance, yoga) engage these processes to varying degrees, resulting in observable differences in outcomes. Mediators partially determine which processes can prevail during intervention. Furthermore, the impact on mental health may be moderated by moderators. For instance, individuals who reported higher stress levels prior to engaging in basketball or dance exhibited a more significant reduction in depression symptoms following the intervention ([Andersen et al., 2018](#)). This observation aligns with our own findings as well ([Horváth & Vécsey, 2023](#)).

Processes interpreted in the model

[Fig. 3](#) illustrates the processes through which – based on our review – movement improvisation may impact mental health. Not all of these processes can be definitively linked to mental health outcomes, as some of them were described as a result of an interview or self-report survey

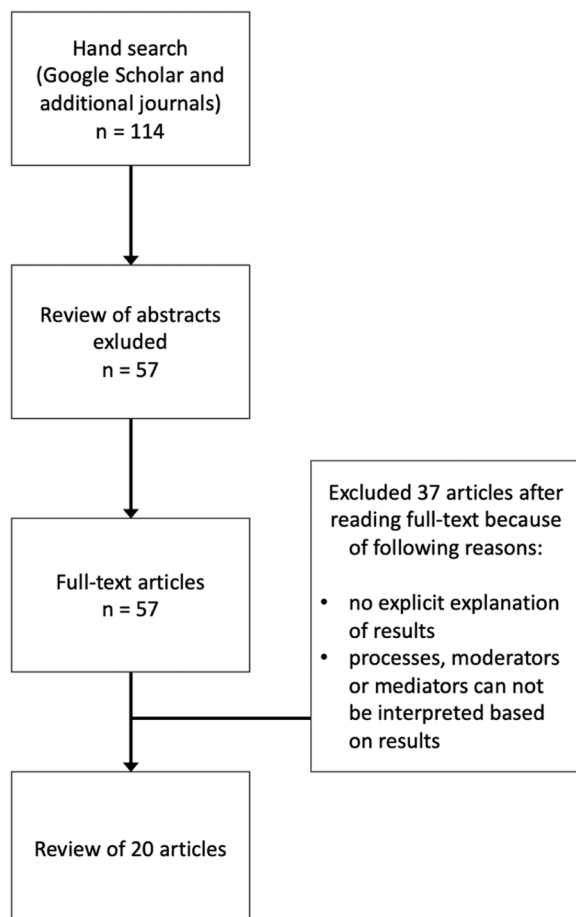


Fig. 1. Search strategy.

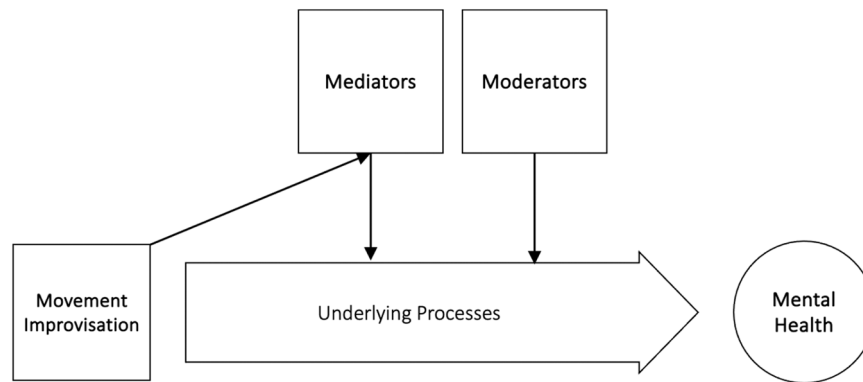


Fig. 2. The connection between movement improvisation and mental health Note. PNI = psychoneuroimmunological.

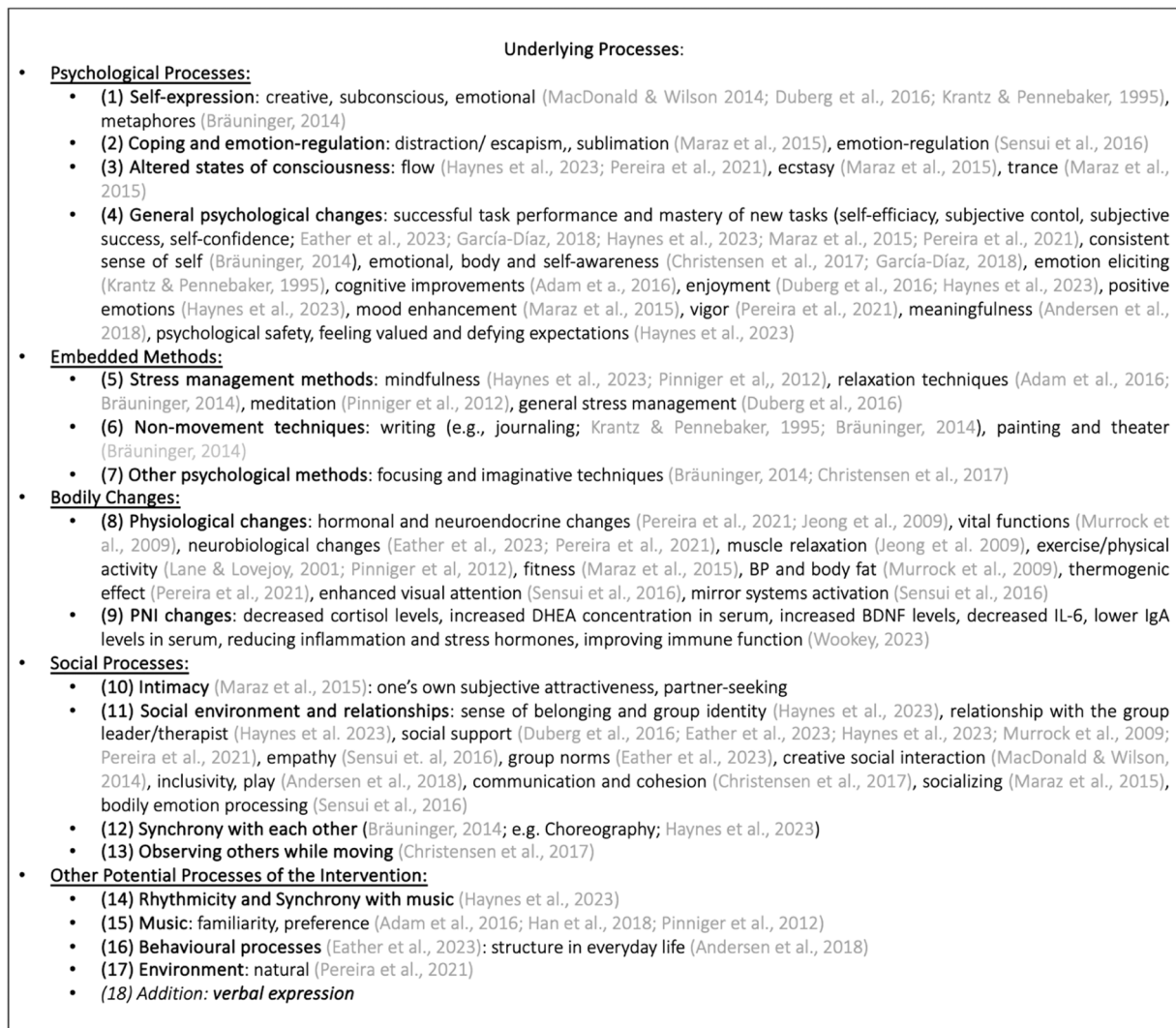


Fig. 3. Underlying processes of movement improvisation Note. PNI = psychoneuroimmunological.

not based on a controlled experiment. The variability in results from different movement studies supports the notion that the intervention's effects depend on certain processes involved. For example, a study found that contemporary dance led to a reduction in depression levels, whereas ballroom dancing did not produce the same effect (Finn et al., 2023; Haboush et al., 2006; see section "Effects of Moderators" for more detail). This indicates that contemporary and ballroom dance likely

engage different processes during the session, which is why we cannot expect identical outcomes when measuring output variables of slightly different interventions. Determining the variance in results within a specific form of movement (e.g., dance style, sport) remains difficult due to the lack of extensive research in the field. Even in more frequently studied areas – such as yoga and Latin dance – significant differences emerge between interventions, particularly in how sessions are

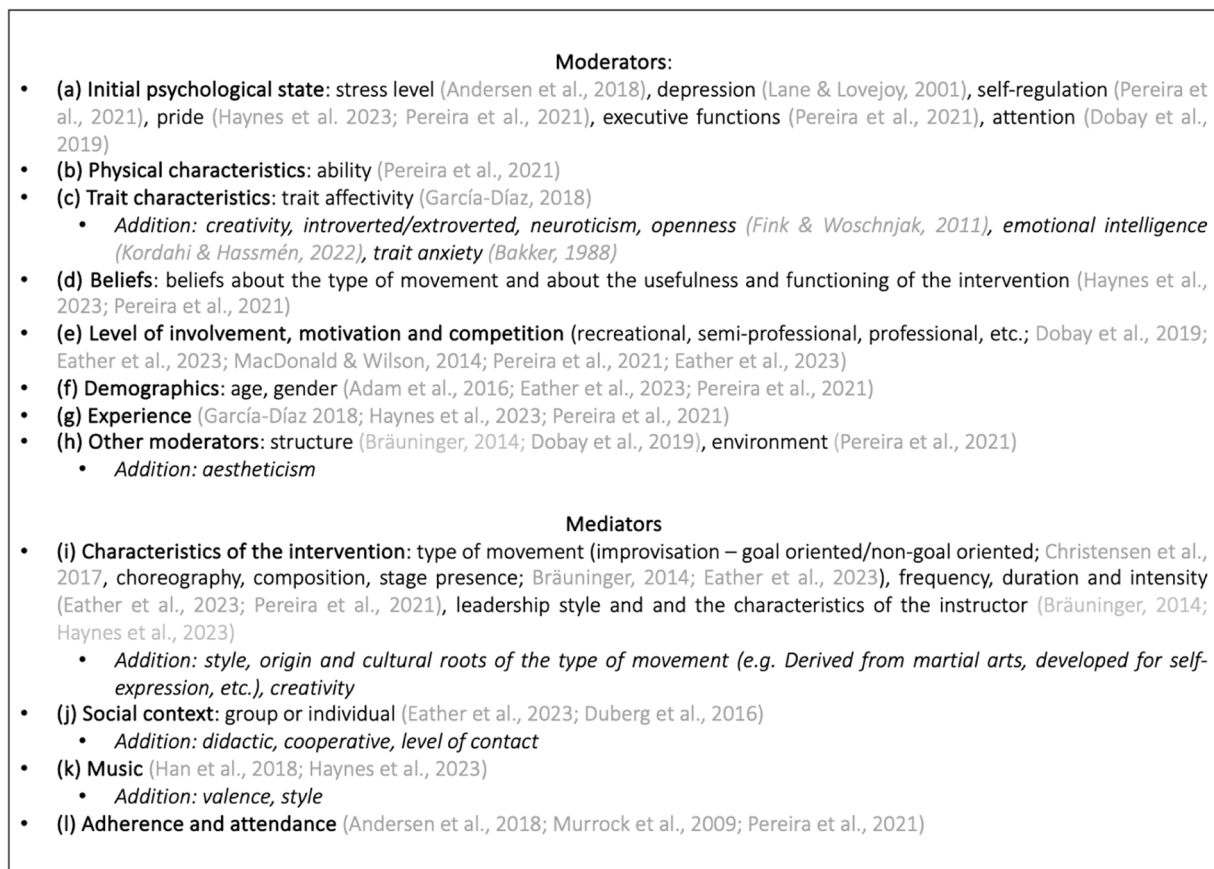


Fig. 4. Moderators and mediators influencing the effects of movement improvisation.

structured and thus outcomes they produce.

Moderators and mediators interpreted in the model

Fig. 3 illustrates the moderators that can influence the effects of the aforementioned processes. These factors can amplify, mask, or modify the expected outcomes. Consequently, the intervention does not solely induce a change in mental health through the mentioned processes; we must consider the influence of moderators as well when designing experiments or interpreting results.

Moderators include individual characteristics, such as initial psychological state, physical characteristics, personality traits, beliefs, degree and quality of motivation and level of involvement, demographic and experience. Mediators consist of contextual factors, which determine which processes are activated by the intervention. For instance, the social context of the intervention influences the potential for synchronization among participants. If it is an individual intervention where the instructor or examiner does not engage in the tasks, this processes will not prevail. In other words, the social context itself is not the processes that drives changes in mental health; rather, it dictates which process can manifest. Mediators include intervention characteristics, social context, and music. Based on our own practical experiences, we have supplemented these factors with several additional variables, as indicated in Fig. 4.

Based on the literature reviewed, the factors illustrated in Figs. 3 and 4 related to movement, dance, and improvisation provide a solid foundation for research utilizing movement improvisation interventions. Our theory does not exclude the possibility of additional processes or moderators.

Discussion: empirical evidence supporting the theory's components

In the introduction, we outlined the challenges in movement improvisation research. We conducted an integrative review on the connection between mental health, dance, movement, and improvisation which, in line with our objectives, provided an overview of the processes, moderators and mediators associated with movement improvisation. The included articles also offered empirical evidence for the effects of most of these components (see sections "Effects of Processes" and "Effects of Moderators and Mediators") on mental health. However, in many cases, the relevance of these variables in the context of movement improvisation interventions remains speculative (see section "Areas Needing Further Examination"). Our work thus also highlighted processes and variables whose effects lack empirical examination, suggesting directions for future research. The processes, moderators and mediators were derived from qualitative and quantitative research, reviews, cross-study comparisons of various movement forms from our integrative review. In the next sections, we present the empirical findings supporting the effects of components listed in Figs. 3 and 4.

Effects of processes

Self-expression (1)

Determining which sports and dance styles allow participants to express themselves through movement is challenging. Presumably, modern, contemporary, and improvisational dances are strongly associated with self-expression, as this is a fundamental element of these styles. They were developed specifically for this purpose (Merényi, 2004), with improvisation allowing a person's thoughts and associations

to manifest through movement (Blom & Chaplin, 1988). Consequently, in relation to self-expression, we reviewed literature that focuses on contemporary and modern dance, improvisation, or authentic movement.

During their eight-week online contemporary dance intervention, Finn et al. (2023) found a statistically significant improvement in participants' well-being after four weeks, along with an increase in self-efficacy after eight weeks. Similarly, Wiedenhofer and Koch (2017) reported similar results in a much shorter intervention, finding that approximately 12 minutes of movement improvisation significantly enhanced participants' well-being and both general and physical self-efficacy. Additionally, Kim and Kim (2007) identified significantly higher levels of well-being among those engaging in improvisational hip-hop dance. This suggests that self-expression may be closely linked to both self-efficacy and well-being (Finn et al., 2023; Wiedenhofer & Koch, 2017; Kim & Kim, 2007). However, the findings regarding other aspects of mental health are inconsistent and incomplete (see: Finn et al., 2023; Park et al., 2020). As a result, we cannot draw firm conclusions about the quality of life, social health, depression, stress, anxiety, and affectivity associated with these forms of exercise.

In their review, Van Lith et al. (2013) mention that art-based practices support psychological recovery, particularly through self-expression. They explain that self-expression allows individuals to release tension and address unresolved feelings, leading to improved mental health outcomes. This expression can happen through "movement metaphors" as Meekums (2008) describes. Although there are ideas about how self-expression manifests in movement and its specific effects on mental health, accurately measuring it remains challenging. Future quantitative and qualitative research is needed to explore how participants express themselves through movement and how this impacts mental health.

Coping and emotion-regulation (2)

Among the psychological processes, several types of *coping and emotion-regulation* (2) can prevail during movement. In the case of distraction or escapism, an individual shifts their focus to another activity, perhaps movement improvisation, which provides a more enjoyable experience. Consequently, this can lead to a reduction in negative emotions, an increase in positive affects, and an enhanced sense of control (Kindler, 2010). Sublimation allows individuals to relieve internal tension and stress by expressing these feelings in a constructive way, which can occur through movement improvisation. Similarly, elaboration involves transforming psychological tension into adaptive, positive actions, making this form of movement also suitable for that purpose (László, 2004).

Based on the work of Sensui and colleagues (2016) hip hop dance induces brain activity related emotion-regulation. Adaptive emotion-regulation (e.g., positive reappraisal, acceptance, problem-solving) promotes mental health (see for well-being: Kraiss et al., 2020, see for affectivity: Van Beveren et al., 2018), while maladaptive strategies (e.g., rumination, catastrophizing, self-blame) are connected to mental disorder symptoms (see for depressive symptoms: Kökönyei et al., 2024; for anxiety: Suveg & Zeman, 2004).

Altered states of consciousness (3)

In the context of *altered states of consciousness* (3), Csikszentmihályi's theory posits that flow enhances positive emotions, well-being, self-efficacy, and control while reducing stress (Csikszentmihályi, 1988; 1996). The experience of flow has been documented in relation to various forms of movement, including yoga and dance improvisation (Łuczniak & May, 2021; Hsu & Liu, 2020). The term *trance* and *ecstasy* refers to a modified state of consciousness and is related to harnessing resilience and coping mechanisms (Gosseries et al., 2024).

General psychological changes (4)

Movement improvisation can induce various *psychological changes*

(4) as well. Engaging in movement enhances *self-efficacy*, *feeling of success*, and *subjective control* through successful performance and the acquisition of new exercises (Haynes et al., 2023; Eather et al., 2023; García-Díaz, 2018; Maraz et al., 2015; Pereira et al., 2021), which can lead to self-confidence (MacDonald & Wilson, 2014; Maraz et al., 2015) and more effective coping with stress (Schönfeld et al., 2016).

Bräuninger (2014) posits that *freely experiencing emotions* results in a more consistent sense of self, which can manifest as changes in affectivity. García-Díaz (2018) found similar results in his research; despite a decrease in positive affectivity and an increase in negative affectivity following authentic movement (AM), participants reported the intervention as enjoyable. According to García-Díaz, authentic movement fosters eudaimonic well-being by allowing individuals to express their inner world through movement. This aligns with the previously mentioned concepts of elaboration and sublimation. From a psychodynamic perspective, certain forms of movement provide individuals with the space to express inner tension and repressed feelings or to transform them into positive action. Consequently, this can enhance a person's eudaimonic well-being while reducing internal tension.

García-Díaz (2018) and Christensen et al. (2017) argue that dance enhances *body and emotional awareness*. Twiner et al. (2022), along with San-Huan-Ferrer and Hípola (2019), examined the effects of dance on emotions, and their findings support Christensen and colleagues' idea. However, there is a limited number of studies examining the relationship between body and emotional awareness and dance improvisation, highlighting future areas for research.

Krantz and Pennebaker (1995) describe the *emotion-eliciting* nature of creative movement. In movement improvisation, participants focus more on their bodily signals, and by expressing these sensations, feelings, and thoughts in a creative and spontaneous way, they enhance the connection between emotions and bodily sensations (Morris, 2021). This process fosters greater body and emotional awareness, eliciting emotions that contribute to a more consistent sense of self. These emotions can be both negative and positive.

Dance and movement tend to enhance *positive emotions*, *enjoyment*, and *vigor*, which contribute to higher attendance and adherence (Murrock et al., 2009; Andersen et al., 2018; Duberg et al., 2016). Researchers do not describe this in detail, but the authors of this study believe that music, the mastery of new tasks, and the social setting are important processes contributing to this change. Emotional awareness and positive affectivity are both important in preserving and restoring mental health (Schutte et al., 2002).

Adam et al. (2016) found that dance *improved cognitive symptoms* in individuals with mild to moderate cognitive impairment. They describe this improvement as contributing to better mental health by enhancing coping with symptoms and fostering a sense of independence.

Andersen et al. (2018) found that in sports by creating a *psychological safe space* and *defying expectations* participants can *feel valued* and have a sense of control. This leads to *meaningfulness* in their participation in sport which can be connected to adherence and positive emotions.

Stress management methods (5)

Among the *stress management methods* (5), mindfulness has been shown to reduce depressive and anxiety symptoms while improving quality of life (Khouri et al., 2015, cited in Urbán, 2022). Progressive muscle relaxation can also be applied to alleviate anxiety (Manzoni et al., 2008, cited in Urbán, 2022), as can focusing meditations, which have proven effective in reducing depression and the physiological response to stress (Carrington 2007, cited in Urbán, 2022; Nidich et al., 2009, cited in Urbán, 2022). These methods along with other relaxation techniques can be integrated into movement improvisation, either at the beginning and end of the session or in conjunction with specific movement tasks.

Non-movement techniques (6)

In Krantz and Pennebaker's (1995) study, expressive *writing*

positively impacted participants across a broader spectrum. The subjects were tasked with expressing their traumatic experiences through movement. Following this, one group described their thoughts and feelings about the intervention. While both groups reported feeling happier and healthier, the group that also engaged in journaling exhibited improvements in several objective variables, including academic performance and physical health status.

Bräuninger (2014) mentions that *painting* and *theater* are non-DMT techniques often incorporated into DMT sessions. These techniques can also be applied in movement improvisation. Since they are already used to promote mental health in Expressive Arts Therapy and Drama Therapy, their integration into movement improvisation can similarly benefit mental health.

Physiological changes (8)

Among the category of bodily changes, *physiological changes* (8) refer to a wide range of changes in *hormonal, neuroendocrine, neural systems and vital functions*. The increased production of endorphins during exercise have a beneficial impact on mental health. In addition to fostering a sense of well-being, endorphins have a muscle-relaxing effect that effectively reduces stress levels (Pfau & Kanyó, 2020). Furthermore, exercise reduces the activity of the hypothalamic-pituitary-adrenal (HPA) axis, contributing to a reduction in stress (Nyhuis et al., 2010). Movement also has beneficial effects on blood pressure and body fat, enhances visual attention, activates mirror systems, and has a thermogenic effect (Murrock et al., 2009; Pereira et al., 2021; Sensui et al., 2016).

Psychoneuroimmunological changes (9)

Psychoneuroimmunological changes (9), particularly changes in cortisol and immunoglobulin A levels, are also associated with reduced stress levels. These changes have already been demonstrated in the case of yoga (Wookey, 2023).

Social environment and relationships (11)

Sensui et al. (2016) found that movement can enhance *empathic skills*, improve *recognition of bodily emotional expressions*, and increase attention to emotionally salient stimuli. These changes were observed using fMRI after three weeks of hip-hop dancing.

Eather et al. (2023) found in their meta-analysis that participating in group sports yields greater benefits for mental health indicators compared to individual sports, regardless of whether the class is cooperative (e.g., basketball) or if participants work individually (e.g., yoga). Therefore, it is reasonable to conclude that the social environment plays a significant role in enhancing the positive effects of exercise on mental health. Engaging in movement or dance within a group has also been shown to reduce feelings of loneliness (Finn et al., 2023).

Eather and colleagues (2023) say the social environment exerts its effects through *social support, group norms, belonging and companionship, social influence and comparison, behavioural guidance and social control*. Duberg and colleagues (2016), Haynes and colleagues (2023), Murrock and colleagues (2009) and Pereira and colleagues (2021) also highlight the importance of social support in the effects of movement. Next to sense of belonging Haynes et al. (2023) described group identity as an important part of this process. They further mention the importance of the relationship with the group leader and their characteristics in the effects of movement. Other authors highlight the role of creative social interaction (MacDonald & Wilson, 2014), inclusivity and play (Andersen et al., 2018), communication and cohesion (Christensen et al., 2017) and socializing (Maraz et al., 2015) in the context of movement sessions.

Synchrony with each other (12)

Bräuninger examined the effects of spatial synchrony and synchrony in effort – individual DMT interventions – on mental health outcomes and found that they were important processes in promoting well-being and decreasing somatization symptoms. Synchronized movement in

social interactions is important (Ramseyer, 2013). Greater movement synchronization was associated with better relationship quality and improved interactional outcomes in Ramseyer, (2013) research. Less synchronized body and facial movements during interviews were indicators of depression (Altmann et al., 2021). Thus, movement synchrony appears to be an important factor in human relationships. However, its role in movement improvisation remains empirically unexplored.

Observing others while moving (13)

Observing others while moving can elicit affective reactions in individuals. Juslin and Västfjäll (2008) proposed a theoretical framework explaining how a visual stimulus can provoke an emotional response. While most research in this area focuses on art and music, Christensen et al. (2017) expanded the field to include the observation of dance. Their findings indicate that watching dance can evoke emotions by activating autobiographical memories, with round positions eliciting more positive emotions in participants compared to square or non-round postures. Beyond the impact of observing dance on affectivity, it would be valuable to investigate whether it induces changes in other aspects of mental health.

Music (15)

Music can also influence the effects of the intervention. Han (2018) compares the effects of *familiar and preferred music*, noting that familiar music can evoke memories and create a safe environment, while preferred music enhances adherence and improves mood. The style of music is also significant, depending on individual preferences and familiarity. Lesté and Rust (1990), along with Koch et al. (2007), implemented musical interventions with groups of dancers and athletes. As a result of listening to music compared to two groups participating in dance and sports interventions, they found a positive change only in positive affectivity. Furthermore, Starcke et al. (2021) researched the effect of music valence on emotions and discovered that listening to happy music could induce a more positive mood in participants.

Behavioural processes (16)

Eather et al. (2023) describes that sports participation leads to changes in behaviour which contributes to better mental health. Regular attendance at movement classes creates *structure in everyday life*, which contributes to the preservation of mental health (Li et al., 2022).

Environment (17)

In terms of *environment*, comparative studies have shown that outdoor exercise sessions lead to greater positive changes in mental health compared to indoor sessions (Bramwell et al., 2023; Byrka & Ryczko, 2018). In this context, various locations (e.g., school, laboratory, dance hall) may also have influencing effects, which still await further investigation.

Effects of moderators and mediators

Moderators

Initial psychological state (a). Among the studies mentioning the influence of moderators and mediators, research by Andersen et al. (2018), and Lane and Lovejoy (2001) indicates that an individual's initial psychological state significantly affects changes in mental health following interventions in team sports and aerobic dance. Specifically, individuals exhibiting higher levels of *stress* and *depression* at the onset of a movement session tend to experience greater improvements. Our previous research also supports this finding (Horváth & Vécsey, 2023). *Executive functions, self-regulation* and *pride* also seem to play important roles in attendance through action planning and action control (Pereira et al., 2021). Dobay et al. (2019) describe the importance of *attention* in a

dance class for involvement and motivation, which further influence the effects of these processes.

Physical characteristics (b). One's *ability* appears to influence participation through motivation, as Bell and Stephenson (2014) found differences in why people run based on their ability (Bell & Stephenson, 2014, in Pereira et al., 2021).

Trait characteristics (c). Results can also be influenced by trait characteristics. This is demonstrated by the research of García-Díaz (2018) on authentic movement, which found that positive affectivity decreased among individuals with high positive *trait affectivity*, while remaining stable in those with low positive trait affectivity. Conversely, individuals with high negative trait affectivity exhibited a greater increase in negative affectivity after exercise compared to those with low negative trait affectivity. Our previous findings also support this trend (Horváth & Vécsey, 2023).

According to trait theories, personality is viewed as a constant feature that remains unchanged as a result of engaging in sports or dance; however, notable differences exist between the personalities of dancers and non-dancers (Eysenck et al., 1982). Professional dancers – whether in ballet, contemporary, or jazz/musical genres – tend to be more *creative* and *introverted* than non-dancers, often scoring high on the scales of *neuroticism* and *openness to experience* (Fink & Woschnjak, 2011). Research by Kordahi and Hassmén (2022) revealed that dancers of various styles exhibit significantly higher ability-based *emotional intelligence* scores compared to non-dancers. This heightened emotional awareness is linked to the physical nature of dance, where dancers become more aware of their movements and can ascribe meaning to the emotions they experience (Fernández et al., 2020). Dance fosters the development of observation, perception, awareness, and the physical expression of emotions, all of which contribute to enhancing emotional intelligence (Atamtürk & Dincdolek, 2021). Bakker, (1988) research indicated that individuals participating in classical ballet and modern dance classes for 15 hours a week were more prone to anxiety. In general, dancers exhibit lower emotional stability, scoring higher on measures of *emotionality* and anxiety (Bakker, 1988). Furthermore, dancers with high levels of *trait anxiety* have been found to employ more maladaptive coping strategies compared to those with lower levels of trait anxiety (Bakker, 1988; Estanol et al., 2013). It is plausible that high trait anxiety is prevalent among dancers because the expressive nature of dance offers a means to cope with their struggles.

Level of involvement, motivation and competition (e). The level of *competition* is also significant; research shows that professional athletes experience higher anxiety levels compared to recreational athletes, even though playing sports is beneficial for both groups (Eather et al., 2023). Furthermore, Zajenkowski, Jankowski, and Kolata (2014) found that competitive ballroom dancers did not experience an increase in joy after their dance class or competition, while hobby dancers did. Additionally, fatigue levels in competitors did not decrease after either the dance class or the competition.

As mentioned above, some factors can influence the *motivation* to participate in movement (Pereira et al., 2021). Motivation directly affects participation and adherence, and it may also influence the effects of processes. For example, if someone is motivated to attend movement improvisation for its physical and health benefits, they might be more physically active than those who attend for other reasons. Hypothetically, this could allow the processes of bodily change to prevail to a greater extent

Demographics (f). Three studies mentioned the influence of age on mental health outcomes in relation to movement (Adam et al., 2016; Eather et al., 2023; Pereira et al., 2021). Age may affect these outcomes through factors such as ability, motivation, physical characteristics, and

initial psychological state, which vary across age groups.

Experience (g). García-Díaz (2018) demonstrated the importance of prior experience on the effects of an authentic movement intervention. Participants with such experience showed greater improvements. According to García-Díaz (2018), this suggests that training in authentic movement can enhance its effects. Hypothetically, prior experience may also alter beliefs and perceived benefits, which can influence motivation, attendance, and adherence, as noted by the authors of the present study.

Other moderators (h). The *structure* of a dance intervention is crucial for motivation, attendance, and involvement (Bräuninger, 2014; Dobay et al., 2019). Haynes and colleagues (2023) in addition to the importance of the instructor's characteristics emphasized that the content of each dance class plays a significant role in participants' motivation and attendance. Dobay et al. (2019) described how starting with concrete exercises and gradually progressing to more abstract movement and tasks promotes involvement and reflective thinking, further facilitating the effects of the session.

The *environment* in which we exercise can function as a process, as it has distinct effects on mental health, as mentioned earlier. On the other hand, it can also serve as a mediator, influencing which processes prevail. For example it can act as a motivating factor, thereby promoting attendance. Pereira and colleagues (2021) researched the effects of running on mental health. In their review, they found that both extrinsic and intrinsic motives are important for running participation. Participants mentioned connecting with nature while running as a significant factor in their exercise attendance.

Mediators

Characteristics of the intervention (i). The *type of movement* itself is a significant feature of the intervention. Research indicates that non-goal oriented improvisation is more beneficial than goal-oriented improvisation concerning perceived stress and self-efficacy (Wiedenhofer & Koch, 2017).

Frequency, duration and intensity seems to influence the effects of an intervention (Eather et al., 2023; Pereira et al., 2021). It refers to how long, how often and at what intervals participants engage in a given form of movement. Research indicates that in some cases, the effects of the intervention are only valid in the long term (Finn et al., 2023; Adam et al., 2016), and not all effects are maintained over time (Cheung et al., 2016). It may be important to investigate further to determine how long it takes for a specific effect to manifest.

Leadership style (directive, verbal, or a combination) promotes mental health when chosen based on the client's needs, rather than the therapist's preferences (Bräuninger, 2014). Haynes and colleagues (2023) found that the *instructor's characteristics* (e.g., enthusiastic, interactive, positive, empathic) contributed to creating a safe environment and enhancing positive emotions in participants related to the dance class.

Social context (j). *Social context* encompasses various factors through which this process exerts its distinct effects. On the other hand, it can also serve as a mediator variable, as it provides the foundation for these social processes. For example, participants can move alone, with the instructor, with other people simultaneously, or alone while others observe. The social context, therefore, determines which processes can prevail.

Music (k). The involvement of *music* can take many forms. Some types of movement improvisation exclude it altogether (e.g., authentic movement), while others incorporate instrumental pieces, vocal elements, or sounds from various genres with different tempos (bpm) and emotional

tones. Participants might also be invited to create sounds using tools or their own bodies. These variations significantly shape the nature of the intervention.

Adherence and attendance (l). In dance groups, high levels of *adherence (k)* contribute to the lasting effects of interventions, allowing short-term benefits to persist over time (Andersen et al., 2018; Murrock et al., 2009; Pereira et al., 2021).

Areas needing further examination

Among the processes, moderators and mediators listed in our theory, some have not yet been investigated regarding their impact on mental health in relation to movement. These include other psychological methods, intimacy, social environment and relationships, rhythmicity and verbal expression, level of involvement, motivation and competition, characteristics of the intervention. We have expanded the list based on the literature with concepts such as verbal expression, style, the origin and cultural roots of the type of movement, the pursuit of aestheticization, creativity, dyadic nature, cooperation, the level of contact, and the valence and style of the music used. Although, to the best of the authors' knowledge, there are no empirical studies aimed at these areas in the field of movement, we will present literature that highlights the importance of these factors in mental health (e.g., depression, stress, anxiety, affectivity, well-being, quality of life, self-efficacy, and social health).

Other psychological methods (7). *Focusing on a specific topic* while dancing has been identified as one function of dance (Christensen et al., 2017). Focusing on a specific topic while moving is a technique commonly used in DMT (Bräuninger, 2014). However, the authors of this study are not aware of any research investigating its distinct effects on mental health in a non-therapeutic setting. Imaginative techniques (e.g., guided imagery) are often used in psychotherapy, and their beneficial effects on mental health are well-documented (Utay & Miller, 2006). Furthermore, dancers frequently engage in imagery while dancing; however, empirical research on its distinct effects on mental health in the context of dancing is lacking (Pavlik & Nordin-Bates, 2016).

Intimacy (10). Maraz et al. (2015) developed the Dance Motivation Inventory, a tool designed to examine the motives behind dancing. One of the factors in the questionnaire is intimacy, which refers to the enjoyment people derive from wearing attractive clothes while dancing, the opportunity to find sexual partners and form other relationships, and the chance to physically connect with others. However, we have not found any empirical research on how the intimacy experienced during movement affects a person's mental health, leaving this question unanswered for now.

Social environment and relationships (11). Haynes and colleagues (2023) described the importance of instructor characteristics in eliciting positive emotions in participants. However, we did not find any research that specifically investigates how specific characteristics of the session leader influence the outcomes of movement interventions in a controlled trial. Furthermore, while the instructor's role and level of involvement are clear during the teaching of choreography, this is not always the case with improvisation. In the latter, the leader may either not get involved in the movement throughout the session, except for giving instructions, or they may actively participate in the tasks alongside the participants. In some cases, the leader may even initiate contact improvisation, which fosters a deeper level of connection. Furthermore, movement improvisation sessions can take place individually or in groups and may also involve cooperative, or contact tasks. We found a lack of empirical evidence regarding the specific effects of these different social configurations on mental health.

Rhythmicity and synchrony with music (14). Haynes and colleagues (2023) found in a qualitative study that dancing to music is an important factor for participants' attendance in dance classes, as it makes movement enjoyable. However, we found no empirical studies comparing dancing in synchrony with music to dancing independently of music.

Thus, in the case of synchrony with music, we considered studies in which participants performed choreographed movements (aerobics, choreography, ballroom dancing, Turkish folk dance, belly dance, hip hop, African dance, modern, and contemporary dance). Based on these studies, it seems that synchronization with music can enhance self-efficacy, increase well-being, and reduce stress levels (Finn et al., 2023; Kim & Kim, 2007; Tuncgenç et al., 2023; Liu et al., 2023). A significant result regarding stress was obtained by Zajenkowski, Jan-kowski, and Kołata (2014) while studying ballroom dancers. In their research, the level of relaxation significantly depended on the nature of the dance class (competition or training). This serves as another example of how processes and moderators can interact regarding the expressed effects (in this case, the characteristics of the intervention and the impact of synchronization with music), as both instances involved choreographed movement, yet different results were obtained concerning relaxation.

Verbal expression (18). We supplemented the processes identified in the literature with verbal expression, which was incorporated in some of the included studies (see Duberg et al., 2016; García-Díaz, 2018; Dobay et al., 2019) and, based on our practical experience as well, can be an important factor in the effectiveness of the intervention. Verbality can be incorporated at the beginning, end, or even during the session, embedded within the tasks. By including verbal expression, we provide a new platform for improvisation, allowing participants to vocalize their immediate thoughts and impulses (Gueugnon et al., 2016 In Coste et al., 2019). It can also be used for reflecting on personal experiences and thoughts, or as a means of dialogue between participants. Additionally, participants can offer feedback on each other's performances or on the experiences shared by the speaker. However, we found no studies comparing movement improvisation sessions that include verbal elements with those that exclude them.

Beliefs (d). Haynes and colleagues (2023) found in their qualitative research that a person's opinion about the form of movement and their thoughts on its potential processes and effects on mental health are significant in understanding the impact of dance. The research by Ajzen and Driver (1991) supports the idea that beliefs about a leisure activity influence attendance. García-Díaz (2018), using authentic movement, discovered that those with prior experience in this type of movement showed significant changes in levels of happiness and anxiety compared to those who were trying it for the first time. Although García-Díaz does not discuss the reasons for this change, we have often observed in practice that after just one or two sessions of movement improvisation, participants develop a significantly more positive attitude towards the activity. Thus, it is conceivable that prior experience influences the effectiveness of the intervention through a person's beliefs; however, this assumption requires further validation.

Other moderators (h). Furthermore, the pursuit of aestheticization – based on our practical experiences – can create anxiety-inducing situations, especially for beginners. If a participant is not yet confident in their movement and the instructor asks them to move aesthetically, they may experience distress. We believe it would be worthwhile to conduct qualitative studies on the participants' experiences.

Characteristics of the intervention (i). Type of movement

It is difficult to definitively establish the differences between various forms of movement and dance styles. We discuss differences between the effects of different types of movement and dance styles on mental health.

Yoga has proven to be a widely researched topic, with numerous meta-analyses emerging in recent years. According to the work of [Park and Slattery \(2021\)](#), this form of movement can reduce stress levels and shift the balance of the autonomic nervous system towards parasympathetic activation. The authors suggest that it can be an effective complementary method for individuals diagnosed with anxiety, depression, and other mental illnesses. In line with this, [Kelley and Kelley \(2020\)](#) also supported the benefits of yoga in relation to mental health. Yoga significantly improved the quality of life and mental well-being among older adults. [Chobe et al. \(2020\)](#), in their examination of research involving older populations, found that yoga has a beneficial effect on depression levels; however, they did not find significant associations with anxiety, stress, or mood. In their meta-analysis, [Brinsley and colleagues \(2021\)](#) found a decrease in depressive symptoms as a result of yoga among individuals with various mental disorders (depression, PTSD, schizophrenia, anxiety, alcohol dependence, bipolar disorder). Movement improvisation and yoga share many similarities. Both employ relaxation techniques, may involve connecting movement with breathing, incorporate stretching movements, and can lead to an increase in heart rate.

In the case of Pilates, aerobics, and various sports, we found contradictory results once again (see, for example, aerobics: [Bisbe et al., 2020](#); [Kim & Kim, 2007](#)). We summarized the research findings related to different sports collectively, as the processes of physical activity may serve as a common moderator in both these areas and movement improvisation. In this context, we consistently observed positive changes only in social health (positive relationships with others, loneliness, social isolation, sense of belonging, and perceived social support; [Oswald et al., 2020](#); [Andersen et al., 2018](#)).

There is very little research concerning contemporary, modern, African, belly dance, and authentic movement, which makes it difficult to draw clear conclusions regarding these forms of movement. Overall, we can observe that hip hop dance may be effective in reducing stress and anxiety while enhancing positive affectivity, well-being, and social health ([Kim & Kim, 2007](#); [Sensui et al., 2016](#); [Tuncgenc et al., 2023](#)). In contrast, ballroom dancing may help reduce levels of depression, stress, and anxiety, while also improving quality of life and social health ([Moratelli et al., 2023](#); [Pinniger et al., 2012](#); [Akandere & Demir, 2011](#); [Liu et al., 2023](#)).

Differences exist in the effects of various dance styles and movement types. We demonstrate through four studies how differences arise between dance styles, for example, in terms of changes in depression levels.

[Baptista et al. \(2012\)](#) examined the effects of a 16-week (2x/week, 60-minute sessions) belly dance program on 40 adults aged 18–65. Belly dance, characterized by movements of the abdomen and hips, was performed by participants diagnosed with fibromyalgia, who collectively learned a dance routine during the longitudinal intervention. The intervention did not significantly reduce depression levels. This outcome may be attributed to the characteristics of the dance style, the clinical nature of the sample, or the limited bodily involvement during the sessions. Importantly, fibromyalgia, which causes widespread pain and distress, likely hindered participants' full engagement compared to healthy individuals.

[Finn et al. \(2023\)](#) conducted an 8-week (1x/week, 90-minute sessions) online contemporary dance program with 27 young adults aged 16–24 living with anxiety. This intervention significantly reduced depression levels. The general benefits of physical activity likely played a limited role in these results, since this process is also present in other dance styles. Processes such as ones connected to social environment may have been less pronounced due to the online format. Instead, the participants' initial mental state, physical condition (in contrast to fibromyalgia patients), and the content of the dance sessions (e.g., choreography, improvisation) likely contributed more to the observed improvements.

[Eygör et al. \(2009\)](#) investigated the effects of an 8-week (3x/week,

60-minute sessions) Turkish folk dance program on 40 women aged 65 and older. Depression levels did not change following the intervention. Moderators influencing these results may include beyond what was previously mentioned, the advanced age of the participants.

[Pinniger et al. \(2012\)](#) studied a 6-week (1x/week, 90-minute sessions) tango dance intervention with 66 adults aged 18–80. Depression levels significantly decreased by the end of the intervention. In addition to the dance style, the above mentioned factors could contribute to such results.

Overall, two studies demonstrated significant improvements in depression levels, while two found no changes. Both effective and ineffective interventions could involve underlying processes based on our theoretical concept, such as psychological processes, bodily changes, and social processes (except in the study conducted by Finn et al. due to the lack of direct contact). Factors such as initial psychological state, trait characteristics, level of involvement and motivation, music, social context, and intervention characteristics (e.g., dance style and session components) likely contributed to the observed effects, as proposed in our model. See the mentioned processes in more detail in [Figs. 2 and 3](#). The main focus of our study is to gather existing information on the possible processes of movement from empirical research relevant to movement improvisation. However, systematic reviews comparing the effects of different movement interventions on a specific variable would be very useful in the future to gain a deeper understanding of the effects of these processes and the complex mechanism.

Origin and cultural roots of movement types, aestheticization, and creativity

The origin of movement is another variable that is not highlighted in most studies but may be important for the interpretability of results. Modern and contemporary dance are genres that developed from the rejection of constraints and the pursuit of emotional expression. Within this genre, contact improvisation emerged, where two individuals move improvisationally in interaction with each other, attuning to one another. This is a fundamentally different quality of partner dance compared to what is typically seen in hip hop or ballroom dancing. Of course, it is also possible to dance in pairs in such a way that the emphasis is placed on attunement, but generally speaking, in hip hop, for example, the partners alternate dancing while observing each other in a battle situation. Therefore, it is worthwhile to understand the origins of each style, as there can be significant differences between certain dance types. Ideally, authors should provide detailed description of the nature and purpose of the intervention.

Creativity

Incorporating creativity into movement improvisation sessions raises similar questions to the pursuit of aestheticization. Based on our experiences, beginners often find it easier to enjoy and engage in the session if the movement improvisation is guided, particularly at the beginning of the class. It helps them blossom if we demonstrate specific movements, thereby losing some of the improvisational nature. Once the participants become familiar with their body's capabilities and can immerse themselves in the work of movement, they typically find it much easier to express their inner experiences through creative and improvisational tasks. On the other hand, providing participants with specific ideas can detract from their focus on their own creative expressions. Furthermore some processes rely on creativity (e.g., self-expression, emotional awareness, consistent sense of self).

Differences between choreography and improvisation

Research findings indicate that the effects of improvisational movement on self-efficacy and quality of life are consistently positive ([Wiedenhofer & Koch, 2017](#); [Bracco et al., 2023](#)). However, when examining other variables associated with mental health, the results remain contradictory, particularly in relation to depression (see, for example, [Park et al., 2020](#); [Branson Dame et al., 2024](#)). Conversely, interventions incorporating choreography demonstrate significant improvements in depression, anxiety, and both social and psychological well-being following participation ([Adam et al., 2016](#); [Ventura et al.,](#)

2016; Koch et al., 2007; Tuncgenc et al., 2023). It is crucial to acknowledge, however, that without the presence of replication studies and control groups, a definitive comparison of the effects of these two movement modalities cannot be established.

In summary, we cannot definitively conclude that movement improvisation has a significant and clearly beneficial overall effect on mental health variables (such as perceived stress, affectivity, social anxiety, and well-being); however, we also cannot assert that it has no effect at all. We have drawn important insights regarding how certain forms of movement influence specific mental health variables, while also highlighting characteristics whose role remain contentious. Furthermore, it is possible that other variables play a role in the observed effects of movement improvisation or that these processes could be categorized differently (for example, by combining those that yield similar outcomes).

Conclusion: theoretical model of the mechanism of movement improvisation

The variability in the results of the above mentioned intervention studies encouraged us to approach the mechanism of movement improvisation from an alternative perspective, which is discussed in our theoretical model below. This theoretical idea provides a solution to some of the problems mentioned repeatedly in the field of dance and

movement research. It serves as a groundwork for future research on movement improvisation and a framework for critical reviews of existing literature in the field of mental health, dance and movement.

Our theory on the mechanism of movement improvisation presents a component-specific perspective. Based on our literature review, we conceptualized movement improvisation and movement interventions as being composed of distinct components. Through our review, we identified mechanisms and influencing variables mentioned in empirical literature, categorizing them as processes and moderators and mediators. While some articles support the idea that each component independently impacts mental health, others describe components that lack empirical validation, warranting further investigation. Our theoretical model acknowledges the potential for interactions between components leading to combined effects, which also require future research.

Based on existing literature we have identified 18 processes of movement improvisation: (1) self-expression, (2) coping and emotion-regulation, (3) altered states of consciousness, (4) general psychological changes, (5) stress management methods, (6) non-movement techniques, (7) other psychological methods, (8) physiological changes, (9) psychoneuroimmunological changes, (10) intimacy, (11) social environment and relationships, (12) synchrony with each other, (13) observing others while moving, (14) rhythmicity and synchrony with music, (15) music, and (16) behavioural processes, (17) environment and (18) verbal expression. We enriched the existing list with

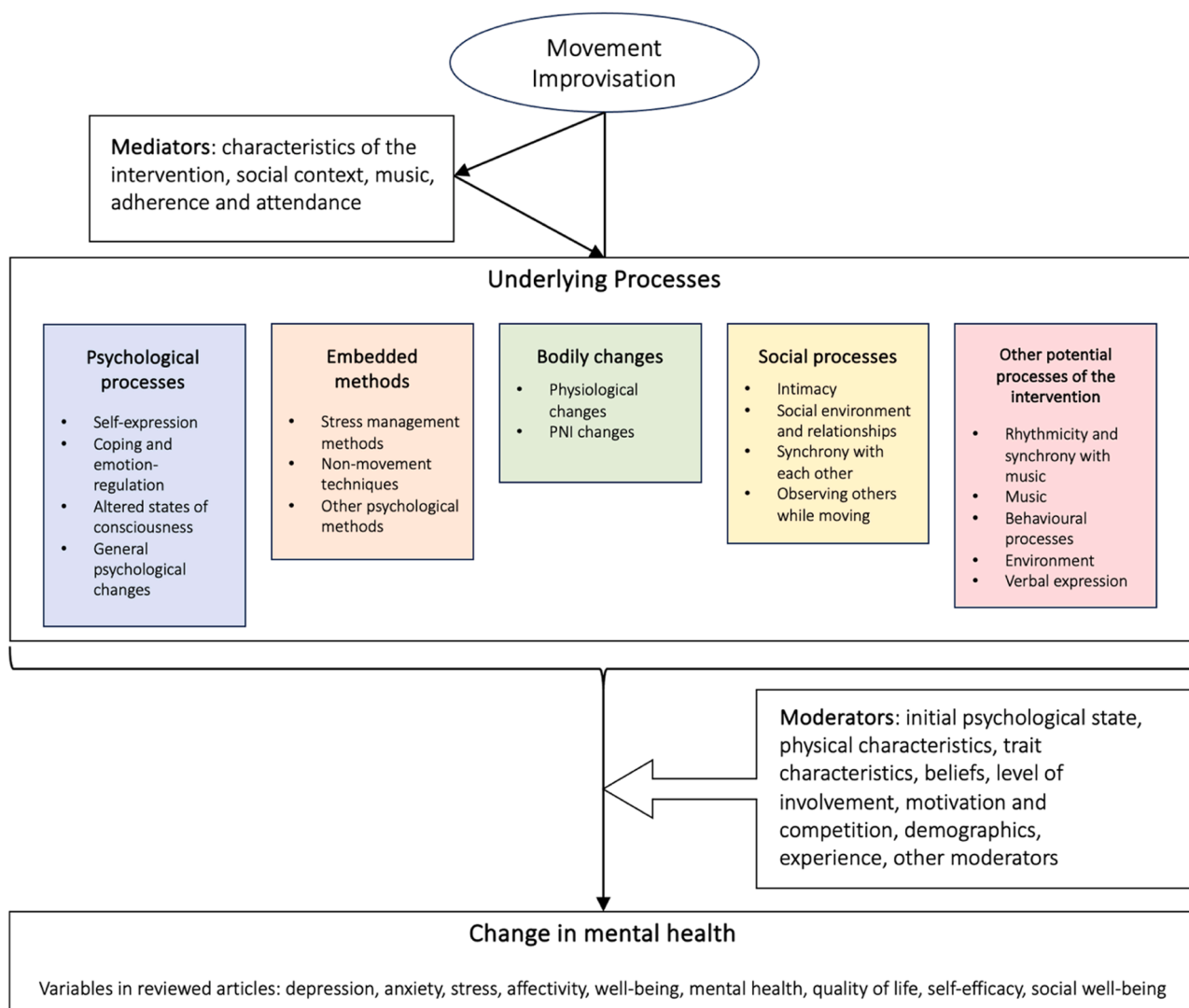


Fig. 5. Theoretical model of the mechanism of movement improvisation Note. PNI = psychoneuroimmunological.

components based on our experiences as instructors, adding important elements that are mentioned in empirical articles, but not fully elaborated on (e.g., verbal expression). While we are aware of the effects of some of these processes on mental health (e.g., relaxation, expressive writing, etc.), the roles of many and the way in which they may interact remain unclear. Changes in mental health occur depending on which processes are expressed in the intervention. One or more of these effects can concurrently be valid and may influence one another. Furthermore, these relationships may also be influenced by other variables, as depicted in Fig. 4. We categorized these factors into two groups: moderators (such as initial psychological state, physical characteristics, trait characteristics, beliefs, level of involvement, motivation and competition, demographics, experience and other moderators) and mediators (including characteristics of the intervention, social context, music and adherence and attendance). Fig. 5 illustrates the theoretical model of the mechanism underlying the effects of movement improvisation.

It is likely that the processes influence additional psychological variables beyond those we have listed, and that there is variability in the strength of each individual effect. Furthermore, it is crucial to acknowledge that the operationalization of the constructs being measured is vital for drawing more precise conclusions regarding the results, as the measurement and conceptualization of each variable can be diverse. This diversity further complicates the comparability of findings. To comprehensively identify all potential processes of movement improvisation, as well as to understand the functioning of the moderators and their specific impacts on various aspects of mental health, future research should include targeted meta-analyses and control group studies grounded in an integrated and unified theoretical framework.

The components of the model are interdependent and together they create different mechanisms. We demonstrated some of the connections between processes, mediators, and moderators. However, we found little empirical work exploring the relationships between these factors and variables. One of the most frequently mentioned mechanism was the mediating role of attendance and adherence. Some moderators (e.g., pride, ability, beliefs, experience, demographics) or processes (e.g., self-regulation, positive emotions, enjoyment as a result of movement, music, environment, defined expectations) are related to motivation to attend movement classes. Furthermore, regular attendance at movement sessions contributes to more impactful and prolonged effects of the processes involved. Another one was self-expression, which through body and emotional awareness can elicit emotions. Observing others while dancing, and music can have the same effects. Experiencing positive emotions as a result of movement also motivates participants to attend and engage further in classes. General psychological processes (e.g., freely experiencing emotions, self-efficacy through self-confidence) and altered states of consciousness are associated with more adaptive coping and emotion-regulation. Other possible mechanisms are not excluded from our theory; however, these were the primary connections described in existing research.

Our study presents a comprehensive summary of the theories and findings related to movement improvisation, which is a fundamental component of DMT. We have synthesized both qualitative and quantitative research results that are essential for a deeper understanding of the impact of this form of movement on mental health. Specifically, we have outlined the processes through which movement improvisation exerts its effects, identified the variables that may influence these processes, and explored how these factors may interact with one another creating the mechanisms of movement improvisation. Additionally, we have emphasized areas where the impact is potentially significant but remains understudied. To enhance the validity and comparability of findings, research on movement improvisation – as well as studies utilizing other forms of movement – should be systematically compiled and evaluated according to consistent criteria. This approach could help reduce contradictions, facilitate result comparisons, and support to perform meta-analyses on the field. Moreover, our summary highlights

pertinent research questions by showcasing the less investigated areas.

The effects of a movement improvisation intervention on mental health cannot be oversimplified to a singular explanation, such as, “participants feel better after the session because they expressed their inner feelings.” While certain processes may exert a more pronounced impact during movement improvisation, further research is necessary to gain a comprehensive understanding of these processes. Nonetheless, the above mentioned self-expression, the unrestricted experience of emotions, elaboration, sublimation, and synchrony are unique and integral elements of movement improvisation, dance, and other movement improvisational activities. It is plausible that the positive outcomes associated with these sessions can be largely attributed to these processes.

Practical implications

The present paper provides a solid foundation for research on movement improvisation, dance or other specific forms of movement. It facilitates more conscious intervention planning and careful consideration in interpreting results. It is crucial to consider what types of results can be anticipated in each examination and to design the intervention mindfully while controlling for variables that may distort the findings through preliminary questions and questionnaires. Additionally, this study offers guidance for conducting literature reviews and interpreting results in the field of movement improvisation. The proposed theory can assist in selecting appropriate components for interventions aimed at achieving desired outcomes for researchers. When considering various movement and DMT methods, this framework can also be beneficial in individual practice, as instructors might want to select different exercises for clients based on the specific changes they aim to achieve.

Limitations and future outlook

The limited comparability of results in this field, along with the lack of standardized forms in dance and most movement practices, as well as the variability in methods and measurement of constructs, posed significant challenges. Consequently, in many instances, we were unable to draw definitive conclusions and instead identified questions that require further investigation. Given the limited research directly addressing movement improvisation, our review included studies from a broader field, resulting in a heterogeneous selection. Thus our limitations must be taken into consideration when interpreting our conclusions.

The lack of unified definitions for key concepts, such as movement, dance, and improvisation, further complicates interpretation, as these terms may be understood differently. While our focus was on mental health, movement improvisation also impacts cognition and physiological indicators. Future research should explore these areas to expand upon our theory. Additionally, as noted by Koch et al. (2014), the field of dance research often relies on practical experience due to the scarcity of primary studies. This exploratory approach provides critical groundwork, generating hypotheses and addressing gaps in the literature to guide future investigations.

CRediT authorship contribution statement

Zuber Frida: Writing – original draft. **Varga Fanni:** Writing – review & editing, Project administration. **Vécsey Boglárka Kitti:** Writing – review & editing, Methodology. **Nagy Beáta Magda:** Supervision. **Gáspár Mihály:** Supervision. **Horváth Milla:** Writing – original draft, Methodology, Conceptualization.

Declaration of Competing Interest

The authors have no conflicts of interest to disclose.

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Data availability

Data is presented in Table 1.

References

- Adam, D., Ramli, A., & Shahar, S. (2016). Effectiveness of a combined dance and relaxation intervention on reducing anxiety and depression and improving quality of life among the cognitively impaired elderly. *Sultan Qaboos University Medical Journal*, 16(1), 47–53. <https://doi.org/10.18295/squmj.2016.16.01.009>
- Ajzen, I., & Driver, B. L. (1991). Prediction of leisure participation from behavioral, normative, and control beliefs: An application of the theory of planned behavior. *Leisure Sciences*, 13(3), 185–204. <https://doi.org/10.1080/01490409109513137>
- Akandere, M., & Demir, B. (2011). The effect of dance over depression. *Collegium Antropologicum*, 35(3), 651–656. (<https://hrcak.srce.hr/file/107423>).
- Altmann, U., Brummel, M., Meier, J., & Strauss, B. (2021). Movement synchrony and facial synchrony as diagnostic features of depression: A pilot study. *The Journal of Nervous and Mental Disease*, 209(2), 128–136. <https://doi.org/10.1097/NMD.0000000000001268>
- Aluede, C. O., & Eregare, E. A. (2006). Dance without music: An academic fable and practical fallacy in Nigeria. *The Anthropologist*, 8(2), 93–97. <https://doi.org/10.1080/09720073.2006.11890941>
- American Dance Therapy Association. (n.d.). *What is dance/movement therapy?* Retrieved January 2, 2025. (<https://adta.memberclicks.net/what-is-dancemovement-therapy>).
- Andersen, M. H., Ottesen, L., & Thing, L. F. (2018). The social and psychological health outcomes of team sport participation in adults: An integrative review of research. *Scandinavian Journal of Public Health*, 47(8), 832–850. <https://doi.org/10.1177/1403494818791405>
- Atamturk, H., & Dinçdolek, B. (2021). Effects of dance education on emotional intelligence related outcomes. *Revista Giornale e Interdisciplinaridade*, 2(1), 422–434. <https://doi.org/10.51249/gei.v2i01.146>
- Bakker, F. C. (1988). Personality differences between young dancers and non-dancers. *Personality and Individual Differences*, 9(1), 121–131. [https://doi.org/10.1016/0191-8869\(88\)90037-2](https://doi.org/10.1016/0191-8869(88)90037-2)
- Baptista, A. S., Villela, A. L., Jones, A., & Natour, J. (2012). Effectiveness of dance in patients with fibromyalgia: A randomized, single-blind, controlled study. *Clin Exp Rheumatol*, 30(6 74), 18–23. (<https://tinyurl.com/2c86rfup>).
- Bisbe, M., López, E., Moreno, M., Naya, M., de Benetti, C., Milà, R., et al. (2020). Comparative cognitive effects of choreographed exercise and multimodal physical therapy in older adults with amnesic mild cognitive impairment: Randomized clinical trial. *Journal of Alzheimer's Disease*, 73(2), 769–783. <https://doi.org/10.3233/JAD-190552>
- Bjorbækmo, W. S., & Engelsrud, G. H. (2011). My own way of moving—movement improvisation in children's rehabilitation. *Phenomenology Practice*, 5(1). <https://doi.org/10.29173/pandpr19834>
- Blom, L. A., & Chaplin, L. T. (1988). *The Moment of Movement: Dance Improvisation*. Pittsburgh: University of Pittsburgh Press.
- Bracco, L., Cornaro, C., Pinto-Carral, A., Koch, S. C., & Mourey, F. (2023). Tango-therapy intervention for older adults with cognitive impairment living in nursing homes: effects on quality of life, physical abilities and gait. *International Journal of Environmental Research and Public Health*, 20(4), 3521. <https://doi.org/10.3390/ijerph20043521>
- Bramwell, R. C., Streetman, A. E., & Besenyi, G. M. (2023). The effect of outdoor and indoor group exercise classes on psychological stress in college students: A pilot study with randomization. *International Journal of Exercise Science*, 16(5), 1012–1024. (<https://krex.k-state.edu/server/api/core/bitstreams/b230ef84-23c5-4774-b152-80f2b90ae05d/content>).
- Branson Dame, K., Harvey, M. J., Aichele, S., Van Denburg, A. K., Hoyer, L., Joslin, S., et al. (2024). Movement through motherhood: Exploring mood, wellbeing, and prenatal emotional availability (EA) through EA-based dance intervention. *Infant Mental Health Journal*, 45(1), 22–39. <https://doi.org/10.1002/imhj.22093>
- Bräuninger, I. (2014). Specific dance movement therapy interventions—Which are successful? An intervention and correlation study. *The Arts in Psychotherapy*, 41(5), 445–457. <https://doi.org/10.1016/j.aip.2014>
- Brinsley, J., Schuch, F., Lederman, O., Girard, D., Smout, M., Immink, M. A., Stubbs, B., Firth, J., Davison, K., & Rosenbaum, S. (2021). Effects of yoga on depressive symptoms in people with mental disorders: A systematic review and meta-analysis. *British Journal of Sports Medicine*, 55(17), 992–1000. <https://doi.org/10.1136/bjsports-2019-101242>
- Butterworth, M. (2012). Semiotic levels of dance. *Dance Research Journal*, 44(1), 44–60.
- Byrka, K., & Ryczko, N. (2018). Positive effects of dancing in natural versus indoor settings: The mediating role of engagement in physical activity. *Journal of Environmental Psychology*, 57, 25–33. <https://doi.org/10.1016/j.jenvp.2018.06.002>
- Cheung, D. S. K., Lai, C. K. Y., Wong, F. K. Y., & Leung, M. C. P. (2016). The effects of the music-with-movement intervention on the cognitive functions of people with moderate dementia: A randomized controlled trial. *Aging Mental Health*, 22(3), 306–315. <https://doi.org/10.1080/13607863.2016.1251571>
- Chobe, S., Chobe, M., Metri, K., Patra, S. K., & Nagaratna, R. (2020). Impact of yoga on cognition and mental health among elderly: A systematic review. *Complementary Therapies in Medicine*, 52, Article 102421. <https://doi.org/10.1016/j.ctim.2020.102421>
- Christensen, J. F., Cela-Conde, C. J., & Gomila, A. (2017). Not all about sex: Neural and biobehavioral functions of human dance. *Annals of the New York Academy of Sciences*, 1400(1), 8–32. <https://doi.org/10.1111/nyas.13420>
- Christensen, J. F., Vartanian, M., Sancho-Escanero, L., Khorsandi, S., Yazdi, S. H. N., Farahi, F., Borhani, K., & Gomila, A. (2021). A practice-inspired mindset for researching the psychophysiological and medical health effects of recreational dance (Dance Sport). *Frontiers in Psychology*, 11, Article 588948. <https://doi.org/10.3389/fpsyg.2020.588948>
- Coste, A., Bardy, B. G., & Marin, L. (2019). Towards an embodied signature of improvisation skills. *Frontiers in Psychology*, 10, 2441. <https://doi.org/10.3389/fpsyg.2019.02441>
- Cruz, R., & Sabers, D. (1998). Dance/movement therapy is more effective than previously reported. *The Arts in Psychotherapy*, 25(2), 101–104.
- Csikszentmihályi, M. (1988). The flow experience and its significance for human psychology. In M. Csikszentmihályi, & I. S. Csikszentmihályi (Eds.), *Optimal experience: Psychological studies of flow in consciousness* (pp. 1–15). Cambridge University Press.
- De Witte, M., Orkibi, H., Zarate, R., Karkou, V., Sajjani, N., Malhotra, B., et al. Koch, S. C. (2021). From therapeutic factors to mechanisms of change in the creative arts therapies: A scoping review. *Frontiers in Psychology*, 12, Article 678397. <https://doi.org/10.3389/fpsyg.2021.678397>
- Dobay, J., Novák, M. G., & Horváth, Z. (2019). Performansz-alapú részvételi akciókutatás inkluzív középiskolai mozgás- és tánccsoportban. In M. G. Novák (Ed.), *Részvétel és együttműködés a művészetpedagógiában: Fókuszban: a dráma- és színházpedagógia* (pp. 75–79). Eötvös Loránd University.
- Duberg, Å., Möller, M., & Sunvisson, H. (2016). "I feel free": Experiences of a dance intervention for adolescent girls with internalizing problems. *International Journal of Qualitative Studies on Health and Well-being*, 11(1), 31946. <https://doi.org/10.3402/qhw.v11.31946>
- Dunphy, K., Baker, F. A., Dumaresq, E., Carroll-Haskins, K., Eickholt, J., Ercole, M., et al. Wosch, T. (2019). Creative arts interventions to address depression in older adults: A systematic review of outcomes, processes, and mechanisms. *Frontiers in Psychology*, 9, 2655. <https://doi.org/10.3389/fpsyg.2018.02655>
- Eather, N., Wade, L., Pankowiak, A., & Eime, R. (2023). The impact of sports participation on mental health and social outcomes in adults: A systematic review and the "Mental Health through Sport" conceptual model. *Systematic Reviews*, 12 (102), 1–27. <https://doi.org/10.1186/s13643-023-02264-8>
- Estanol, E., Shepherd, C., & MacDonald, T. (2013). Mental skills as protective attributes against eating disorder risk in dancers. *Journal of Applied Sport Psychology*, 25(2), 209–222. <https://doi.org/10.1080/10413200.2012.712081>
- Eyigor, S., Karapolat, H., Durmaz, B., Ibisoglu, U., & Cakir, S. (2009). A randomized controlled trial of Turkish folklore dance on the physical performance, balance, depression and quality of life in older women. *Archives of gerontology and geriatrics*, 48(1), 84–88. <https://doi.org/10.1016/j.archger.2007.10.008>
- Eysenck, H. J., Nias, D. K. B., & Cox, D. N. (1982). Sport and personality. *Advances in Behaviour Research and Therapy*, 4(1), 1–56. [https://doi.org/10.1016/0146-6402\(82\)90004-2](https://doi.org/10.1016/0146-6402(82)90004-2)
- Fernández, R., de las, H., Mateos, M. E., Carrascal Domínguez, S., & García Coll, V. (2020). Evaluation and analysis of emotional intelligence, mood and coping strategies in two Spanish dance companies. *Research in Dance Education*, 21(3), 231–244. <https://doi.org/10.1080/14647893.2020.1746253>
- Fink, A., & Woschnjak, S. (2011). Creativity and personality in professional dancers. *Personality and Individual Differences*, 51(6), 754–758. <https://doi.org/10.1016/j.paid.2011.06.024>
- Finn, S., Wright, L. H. V., Mak, H. W., Åström, E., Nicholls, L., Dingle, G. A., & Waaran, K. (2023). Expanding the social cure: A mixed-methods approach exploring the role of online group dance as support for young people (aged 16–24) living with anxiety. *Frontiers in Psychology*, 14, 1–17. <https://doi.org/10.3389/fpsyg.2023.1258967>
- Fitch, W. T., & Barnstable, R. (2024). Dance as mindful movement: A perspective from motor learning and predictive coding. *BMC Neuroscience*, 25, 69. <https://doi.org/10.1186/s12868-024-00894-9>
- Fleming, K. M., & Herring, M. P. (2018). The effects of Pilates on mental health outcomes: A meta-analysis of controlled trials. *Complementary Therapies in Medicine*, 37, 80–95. <https://doi.org/10.1016/j.ctim.2018.02.003>
- García-Díaz, S. (2018). The effect of the practice of Authentic Movement on the emotional state. *The Arts in Psychotherapy*, 58, 17–26. <https://doi.org/10.1016/j.aip.2018.03.004>
- Giurchescu, A. (2001). The power of dance and its social and political uses. *Yearbook for Traditional Music*, 33, 109–122. <https://doi.org/10.2307/1519635>
- Gosseries, O., Marie, N., Lafon, Y., Bicego, A., Grégoire, C., Oswald, V., & Vanhaudenhuyse, A. (2024). Exploration of trance states: Phenomenology, brain correlates, and clinical applications. *Current Opinion in Behavioral Sciences*, 58, Article 101400. <https://doi.org/10.1016/j.cobeha.2024.101400>
- Greenberg, L. S. (1986). Change process research. *Journal of Consulting and Clinical Psychology*, 54(1), 4.
- Haboush, A., Floyd, M., Caron, J., LaSota, M., & Alvarez, K. (2006). Ballroom dance lessons for geriatric depression: An exploratory study. *The Arts in Psychotherapy*, 33 (2), 89–97. <https://doi.org/10.1016/j.aip.2005.10.001>
- Han, R. (2018). University of Kansas, Lawrence. *A Mental Model of Music familiarity and Music preference for Music Therapy Practice (Doctoral dissertation)*.

- Hayes, A., Tiedemann, A., Hewton, G., Chenery, J., Sherrington, C., Merom, D., & Gilchrist, H. (2023). "It doesn't feel like exercise": A realist process evaluation of factors that support long-term attendance at dance classes designed for healthy ageing. *Frontiers in Public Health*, 11, Article 1284272. <https://doi.org/10.3389/fpubh.2023.1284272>
- Horváth, M., & Vécsey, B.K. (2023). A tánc improvizáció lelki egészségre gyakorolt hatása [The effects of dance improvisation on mental health]. Paper presented at the 36th National Scientific Students' Association Conference, Pécs, Hungary, April 11.
- Hsu, S. C., & Liu, L. W. (2020). The relationship between serious leisure, flow experience, leisure benefit, and quality of life of yoga. *African Journal of Hospitality, Tourism and Leisure*, 1(10). https://www.ajhtl.com/uploads/7/1/6/3/7163688/article_7_se_gbcss_2019.pdf.
- Imus, S. D., & Young, J. (2023). Aesthetic mutuality: A mechanism of change in the creative arts therapies as applied to dance/movement therapy. *The Arts in Psychotherapy*, 83, Article 102022. <https://doi.org/10.1016/j.aip.2023.102022>
- Jeong, Y. J., Hong, S. C., Lee, M. S., Park, M. C., Kim, Y. K., & Suh, C. M. (2009). Dance movement therapy improves emotional responses and modulates neurohormones in adolescents with mild depression. *International Journal of Neuroscience*, 115(12), 1711–1720. <https://doi.org/10.1080/00207450590958574>
- Juslin, P. N., & Västfjäll, D. (2008). Emotional responses to music: The need to consider underlying mechanisms. *Behavioral and Brain Sciences*, 31(5), 559–575. <https://doi.org/10.1017/S0140525X08005293>
- Kaeppeler, A. L. (1978). Dance in anthropological perspective. *Annual Review of Anthropology*, 31–49. <https://www.jstor.org/stable/2155686>.
- Kelley, G. A., & Kelley, K. S. (2020). Yoga, health-related quality of life, and mental well-being: A re-analysis of a meta-analysis using the quality effects model. *The Journals of Gerontology: Series A*, 75(9), 1732–1736. <https://doi.org/10.1093/gerona/glz284>
- Kim, S., & Kim, J. (2007). Mood after various brief exercise and sport modes: Aerobics, hip-hop dancing, ice skating, and body conditioning. *Perceptual and Motor Skills*, 104(3), 1265–1270. <https://doi.org/10.2466/pms.104.4.1265-1270>
- Kindler, R. (2010). Megküzdési stratégiák – III [Coping strategies – III]. iTakeControl. <https://itakecontrol.hu/megkuzdesi-strategiak-iii/>.
- Koch, S. C., Kunz, T., Kolter, A., Lykou, S., & Cruz, R. (2013). Effects of dance movement therapy and dance on psychological outcomes: A meta-analysis. *Arts in Psychotherapy*, 41(1), 46–64. <https://doi.org/10.1016/j.aip.2013.10.004>
- Koch, S. C., Kunz, T., Lykou, S., & Cruz, R. (2014). Effects of dance movement therapy and dance on health-related psychological outcomes: A meta-analysis. *The Arts in Psychotherapy*, 41(1), 46–64. <https://doi.org/10.1016/j.aip.2013.10.004>
- Koch, S. C., Morlinghaus, K., & Fuchs, T. (2007). The joy dance: Specific effects of a single dance intervention on psychiatric patients with depression. *The Arts in Psychotherapy*, 34(4), 340–349. <https://doi.org/10.1016/j.aip.2007.07.001>
- Kökényei, G., Kovács, L. N., Szabó, J., et al. (2024). Emotion regulation predicts depressive symptoms in adolescents: A prospective study. *J Youth Adolescence*, 53, 142–158. <https://doi.org/10.1007/s10964-023-01894-4>
- Kordahi, Y., & Hassmén, P. (2022). Are dancers more emotionally intelligent and self-regulated than non-dancers? *Research in Dance Education*, 25(3), 331–342. <https://doi.org/10.1080/14647893.2022.2097657>
- Kraiss, J. T., Ten Klooster, P. M., Moskowitz, J. T., & Bohlmeijer, E. T. (2020). The relationship between emotion regulation and well-being in patients with mental disorders: A meta-analysis. *Comprehensive Psychiatry*, 102, Article 152189. <https://doi.org/10.1016/j.comppsy.2020.152189>
- Krantz, A. M., & Pennebaker, J. W. (1995). Unpublished manuscript. *Expression of Traumatic experiences through dance and writing: Psychological and Health effects*.
- Lane, A. M., & Lovejoy, D. J. (2001). The effects of exercise on mood changes: The moderating effect of depressed mood. *Journal of Sports Medicine and Physical Fitness*, 41(4), 539–545. <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=e2247c72e4d0b4c7e6b4d421768f622712ec3d6>.
- László, M. (2004). Énvéddé mechanizmusok személyiség- és klinikai pszichológiai empirikus vizsgálatai [Empirical studies on defense mechanisms in personality and clinical psychology] (Doctoral dissertation). Pécsi Tudományegyetem. <https://pea.lib.pte.hu/bitstream/handle/pea/15242/martin-laszlo-phd-2005.pdf?sequence=4&isAllowed=y>.
- Lesté, A., & Rust, J. (1990). Effects of dance on anxiety. *American Journal of Dance Therapy*, 12(1), 19–25. <https://doi.org/10.1007/BF00844312>
- Li, T. W., Liang, L., Ho, P. L., Yeung, E. T. F., Hobfoll, S. E., & Hou, W. K. (2022). Coping resources mediate the prospective associations between disrupted daily routines and persistent psychiatric symptoms: A population-based cohort study. *Journal of Psychiatric Research*, 152, 260–268. <https://doi.org/10.1016/j.jpsychires.2022.05.033>
- Liu, X., Soh, K. G., & Omar Dev, R. D. (2023). Effect of Latin dance on physical and mental health: A systematic review. *BMC Public Health*, 23, 1332. <https://doi.org/10.1186/s12889-023-16221-6>
- Lovatt, P. (2018). *Dance psychology*. Dr Dance Presents.
- Lucznik, K., & May, J. (2021). Measuring individual and group flow in collaborative improvisational dance. *Thinking Skills and Creativity*, 40, Article 100847. <https://doi.org/10.1016/j.tsc.2021.100847>
- Lynne-Hanna, J. (1979). To dance is human. In J. Blacking (Ed.), *The anthropology of the body* (pp. 123–144). Academic Press.
- MacDonald, R. A., & Wilson, G. B. (2014). Musical improvisation and health: A review. *Psychology of Well-Being*, 4, 1–18. <https://doi.org/10.1186/s13612-014-0020-9>
- Mackrell (2024, December 13). Dance. Britannica. <https://www.britannica.com/art/dance>.
- Maraz, A., Király, O., Urbán, R., Griffiths, M. D., & Demetrovics, Z. (2015). Why do you dance? Development of the Dance Motivation Inventory (DMI). *PLOS ONE*, 10(3), Article e0122866. <https://doi.org/10.1371/journal.pone.0122866>
- Martha Graham reflects on her art and a life in dance. (1985, March 31). *The New York Times*. <https://www.nytimes.com/1985/03/31/arts/martha-graham-reflects-on-her-art-and-a-life-in-dance.html>.
- Meekums, B. (2008). Developing emotional literacy through individual Dance Movement Therapy: A pilot study. *Emotional and Behavioural Difficulties*, 13(2), 95–110. <https://doi.org/10.1080/13632750802027749>
- Meekums, B., Karkou, V., & Nelson, E. A. (2012). Dance movement therapy for depression. *Cochrane Database of Systematic Reviews*, 6. <https://doi.org/10.1002/14651858.CD009895.pub2>
- Merényi, M. (2004). Mozgás- és táncterápia. *Pszichoterápia*, 13(1), 4–15. <http://www.mentalport.hu/a-folyoirat/korabbi-szamok/xiii-evfolyam/2004-februar/merenyi-marta-mozgas-es-tancterapiat/>.
- Moratelli, J. A., Veras, G., Lyra, V. B., da, Silveira, J., Colombo, R., & Guimarães, A. C. de A. (2023). Evidence of the effects of dance interventions on adults' mental health: A systematic review. *Journal of Dance Medicine Science*, 27(4), 183–193. <https://doi.org/10.1177/1089313X231178095></

- Utay, J., & Miller, M. (2006). Guided imagery as an effective therapeutic technique: A brief review of its history and efficacy research. *Journal of Instructional Psychology*, 33(1).
- Van Beveren, M. L., Harding, K., Beyers, W., & Braet, C. (2018). Don't worry, be happy: The role of positive emotionality and adaptive emotion regulation strategies for youth depressive symptoms. *British Journal of Clinical Psychology*, 57(1), 18–41. <https://doi.org/10.1111/bjc.12151>
- Van Lith, T., Schofield, M. J., & Fenner, P. (2013). Identifying the evidence-base for art-based practices and their potential benefit for mental health recovery: A critical review. *Disability and rehabilitation*, 35(16), 1309–1323. <https://doi.org/10.3109/09638288.2012.732188>
- Ventura, M. I., Barnes, D. E., Ross, J. M., Lanni, K. E., Sigvardt, K. A., & Disbrow, E. A. (2016). A pilot study to evaluate multi-dimensional effects of dance for people with Parkinson's disease. *Contemporary Clinical Trials*, 51, 50–55. <https://doi.org/10.1016/j.cct.2016.10.001>
- Wiedenhofer, S., & Koch, S. C. (2017). Active factors in dance/movement therapy: Specifying health effects of non-goal-orientation in movement. *The Arts in Psychotherapy*, 52, 10–23. <https://doi.org/10.1016/j.aip.2016.09.004>
- Wookey, E. (2023). *A systematic review of movement-oriented mind-body interventions and psychoneuroimmunological outcomes for psychological stress and trauma* (Ph.D. diss., Pepperdine University).
- Zajenkowski, M., Jankowski, K. S., & Kolata, D. (2014). Let's dance – feel better! Mood changes following dancing in different situations. *European Journal of Sport Science*, 15(7), 640–646. <https://doi.org/10.1080/17461391.2014.969324>

Glossary

- Movement:** Movement is any physical change in body position relative to a fixed point, encompassing a broad range of actions, from dancing to everyday activities like walking and brushing teeth.
- Dancewest:** Dance is a form of physical movement that combines artistic elements, often performed to music, characterized by either structured or spontaneous motions with communicative, social, and cultural dimensions, impacting both psychological and physical states.
- Movement improvisation:** Movement improvisation is a spontaneous form of movement involving moment-to-moment, unplanned motions shaped by immediate associations, which may include learned dance elements or natural movements, either aligned with a guiding concept or entirely free from specific intent.
- Mechanism:** A mechanism of change is a theory-driven sequence of processes or events that explains in detail how or why therapeutic change occurs.
- Moderator:** A moderator is an external variable that influences the strength or direction of the relationship between a treatment and its outcome, potentially strengthening, weakening, or reversing the effect.
- Mediator:** A mediator is an intervening variable that explains the causal relationship between two variables, illustrating how or why one leads to the other.