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Durham Undergraduate Research in Music & Science

Should performing music well elicit positive emotional reward? A systematic review of existing research into selected emotions and mood-states as relevant to a performer's experience of flow state

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ABSTRACT

Performing is a regular climacteric of emotion in music performance careers. This paper addresses the notoriety of mental health issues across the classical music performance industry by chartering a theoretical baseline of emotional fluctuation throughout a performance. It refers to flow theory and ascertains the extent to which the euphoric disassociation of a flow state can affect a musician's emotional psychological state post-performance in the short- and longer-term. It adheres loosely to professional systematic review methodology to retrieve, screen and synthesise all the relevant literature on the subject. This methodology foregrounded the paucity of empirical data on emotional fluctuation throughout the chronology of a performance; but yielded significant theoretical associations between the six selected emotions and mood-states (SEMS) this investigation concerned itself with. The baseline, formed by a conceptual framework of relationships between the SEMS combined with current knowledge of flow theory and Music Performance Anxiety (MPA), offers a new theoretical contribution to music psychology and performance literature. The theoretical baseline suggests that, if a flow state is achieved, the emotional impact on the performer is definitively positive. The paper also addresses the main reasons why this theoretical baseline may not replicate itself for many.

1. INTRODUCTION

A career as a performing musician is psychologically very demanding. Consistently coping with external pressure (an audience) and its concurrent Music Performance Anxiety (MPA) (Steptoe & Fidler, 1987; Van Kemenade et al., 1995; Kenny, 2011) alongside a plethora of occupational demands including heavy schedules (Willis et al., 2019), a requirement to "maintain a multiplicity of relationships," (Willis et al., 2019, p. 2) and financial and physical strain (Brodsky, 2006; Fishbein et al., 1988; Kenny, 2011) has the obvious potential to arouse negative affect. In the most extreme cases, long-term psychological conditions: clinical depression, chronic stress and General Anxiety Disorder (GAD) (Kenny, 2011; Swart, 2013). These conditions, amongst others, may moreover exist in comorbidity with MPA and intensify its arousal (Kenny, 2011). Hedonic psychology, which postulates the motivation of human behaviour by the symbiotic pursuit of pleasure and, more notably, the avoidance of pain (Diener et al., 2006) is challenged by the career choice of music performance: a profession with a severe mental health stigma (Ascenso et al., 2017; Guster, 2013; McGrath, 2016). An alternative, more satisfactory explanation for this career choice is that performers are motivated not by extrinsic reward (e.g. remuneration) and its immediate pleasures; but by an intrinsic drive for intrapersonal musical growth. Thus: a eudaimonic motivation (Ryff, 2013) may more adequately explicate the professional pursuit of music performance. Ascenso et al. (2017) suggested that one possible source fostering this eudaimonic motivation is the flow state experience during performances, which contrast the challenges of the profession in providing "flashes of intense living against… dull background" (Csikszentmihalyi, 1990; Fritz & Avsec, 2007, p. 13).

Flow state is a temporary psychological state that is extremely enjoyable and elicits a "holistic sensation people feel when they act with total involvement (in an activity)" (Csikszentmihalyi, 1975, p. 36; Fritz & Avsec, 2007). The experience is such that high flow state achievement disassociates people from the context in which they are performing so that "nothing else matters while doing it, they take great pleasure in it and they are very intrinsically motivated" (Fritz & Avsec, 2007, p. 7). The concept of flow is a dimensional construct and can be highly, moderately or residually achieved (Cohen & Bodner, 2018a, 2018b, 2019; Csikszentmihalyi, 1990; de Manzano et al., 2010). There are three pre-conditions for flow: (i) challenge-skill balance; (ii) clear goals; and (iii) clear, immediate feedback (Csikszentmihalyi, 1990). The six experiential characteristics of flow confirm a juxtaposition against the "dull background" and paucity of extrinsic rewards a musician may experience as a professional. The combination of (i) focussed concentration, (ii) intrinsic reward, (iii) merging of action and awareness, (iv) sense of control, (v) lack of self-consciousness and (vi) distorted temporal experience (Csikszentmihalyi, 1990) denotes a euphoric disassociation from negative affect.

Because musicians are especially prone to experiencing flow during performances (Csikszentmihalyi, 1990), they experience this euphoric disassociation on a regular basis. This study aims to establish how this disassociation impacts their general emotional psychological state; and to what extent this impact is evident in the longer-term. The study design is such that it aims to yield a baseline of emotional fluctuation throughout the chronology of a

performance, which is explained further in the **Methods** section. This baseline is highly valuable. On one level, it will provide a point of comparison which will allow psychologists to identify abnormal valence fluctuations surrounding music performances and categorise patients evidencing these into a group of more severely affected individuals; demarcating a group of patients in need of different treatment strategies. Furthermore, the baseline has the potential to form a more complete picture of a performing musician's emotional profile, providing a model for what levels of positive and negative valence a professional musician experiences regularly. On another level, the baseline will benefit studies with a scholarly focus on subjective well-being in musicians; or studies which aim to understand why musicians continue to pursue their highly demanding profession. The baseline will provide a point of reference that allows this bracket of studies to attribute variations in valence indicators to the stimulus of flow state performance.

The baseline this paper aims to yield will offer a theoretical contribution for subsequent empirical testing.

2. METHODS

2.1 Study design. The two-dimensional affect model (Watson et al., 1988; Watson & Clark, 1994) comprising Positive Affect (PA) and Negative Affect (NA) and six Selected Emotions and Mood-States (SEMS) are employed as valence indicators. **Table 1** outlines the chronological markers deployed; **Table 2** outlines the six SEMS. Herein, *psyche* refers to emotional psychological state.

The chronological markers are time periods related to a performance at which the valence indicators are predicted to fluctuate because of the forthcoming/delivered performance. Between 2 and 7 days was deemed an appropriate period for residual emotional impact to be tested in the longer-term; whilst an immediate impact is measured at post-performance.

Table 1. *Chronological markers deployed and their real-time equivalents.*

Chronological Marker	Real-time equivalent
General psyche	Between 2 and 7 days before the performance.
Pre-performance	Within 30 minutes before performing.
In-Flow	During the flow-state performance.
Post-performance	Within 30 minutes after the flow-state performance.
General psyche re-evaluated	Between 2 and 7 days after the flow-state performance.

Table 2. *Six Selected Emotions and Mood-States*.

N.	SEMS
1	State anxiety
2	Depressed mood-state
3	Situational stress
4	Enjoyment
5	Confidence
6	Motivation

SEMS state anxiety, depressed mood-state and situational stress were chosen as indicators of NA. MPA is idiosyncratic to music but is treated within state anxiety as the broader framework. The pretext of extensive research on MPA predicted the systematic review would produce data points on state anxiety levels. Depressed

mood-state was selected as a state indicator of a severe trait, long-term condition; the impact of musical performance on which is highly germane. Situational stress is conceptually similar to anxiety but is defined as related more to the stressors of occupational demands (Willis et al., 2019) rather than performance scenarios.

SEMS enjoyment, confidence and motivation were selected as indicators of PA and as correlated with certain experiential characteristics of a flow state. Enjoyment and motivation are treated as related to 'intrinsic reward:' the former as synonymous and the latter as positively associated (Cohen & Bodner, 2018a; Csikszentmihalyi, 1990; Hallam, 2006). Confidence is treated as existing in negative association with 'loss of self-consciousness'. If existing studies produced a contour of the arousal levels of the PA SEMS, this would be directly tangible with flow state achievement.

2.2 Search strategy. The search strategy is modelled on Willis et al.'s (2019) systematic review investigating the relationship between occupational demands and well-being in performing artists.

Here, the electronic search strategy employed Google Scholar: Advanced Search (GS:AS). Search terms **(**see **Table 3**) ensured only articles with relevant keywords in all three (a, b, c) domains of interest (a. performing musicians who b. achieve a flow state and c. whose SEMS or well-being are mentioned) were retrieved.

Table 3. *Search queries deployed in GS:AS.*

GS:AS Parameter		Inputted query
With **all** of the words	Query 1	("performing musician" OR "music/musical performer" OR "orchestral musician/performer" OR "concert/professional pianist")
	Query 2	AND ("flow state" OR "flow-state" OR "state of flow" OR "optimal/optimised/peak performance")
With **at least one** of the words		("anxiety/anxious" OR "depressed/depression/depressive" OR "motivation/motivated/motivating" OR "arousal/aroused/arousing" OR "confident/confidence" OR "stressful/stressed/stressing" OR "enjoyment/enjoying" OR "well-being" OR "wellbeing" OR "positive affect/valence" OR "negative affect/valence")

2.3 Study selection. The following inclusion criteria were applied: publications that (i) were published in the English language until the search date (28th November 2023); (ii) were qualitative, quantitative or mixed-methods; (iii) gathered data on one or more of the SEMS at the chronological markers; (iv) were investigating emotions/mood-states with a theoretical or empirical relationship with the SEMS; (v) were concerned with the general well-being of musicians.

The following exclusion criteria were applied: (i) non-peer-reviewed publications; (ii) theses below PhD level; (iii) publications that did not concern professional musicians or music performance students at higher education institutions; (iv) publications with a direct focus on an unhealthy, psychologically troubled or disabled demographic; (v) publications that did not assess any of the SEMS, nor any emotion/mood-state with a relationship to the SEMS, nor the well-being of musicians.

2.4 Data collection process: precautions in quantitative syntheses. A baseline in emotional variation throughout the chronology of a performance cannot be chartered quantitatively by a synthesis of quantitative values from different independent studies, given the potential discrepancies in key aspects of study design including participant demographics and results presentation. To charter a quantitative baseline for affect or any of the SEMS, a study had to produce valence indicator values for comparable chronological markers (e.g. pre- and post-performance). Producing a contour for post-performance to general psyche re-evaluated, for instance, was not valued for lack of a baseline value (e.g. general psyche) for comparison. Only one study (Cohen & Bodner, 2018a) offered a quantitative baseline of this kind.

3. RESULTS

3.1 Study selection.

The search strategy produced 106 results. Using the inclusion and exclusion criteria, all the literature was screened as outlined in **Figure 1**. Additional articles were identified using reference list checking and pilot research (see **Figure 1; Limitations**). In the screening process, access problems were encountered and certain publications had to be excluded from the review without a full-text assessment (see **Figure 1**). Ineligible context is exclusion criterion (v); ineligible language indicates non-compliance with inclusion criterion (i); ineligible population consists of exclusion criteria (iii) and (iv); and ineligible publication type consists of exclusion criteria (i) and (ii). After records were screened, they were reviewed at full text against inclusion criteria (ii) to (v) which determined whether they were included in the forthcoming results and discussion. (**Appendix:** all literature reviewed at full text.)

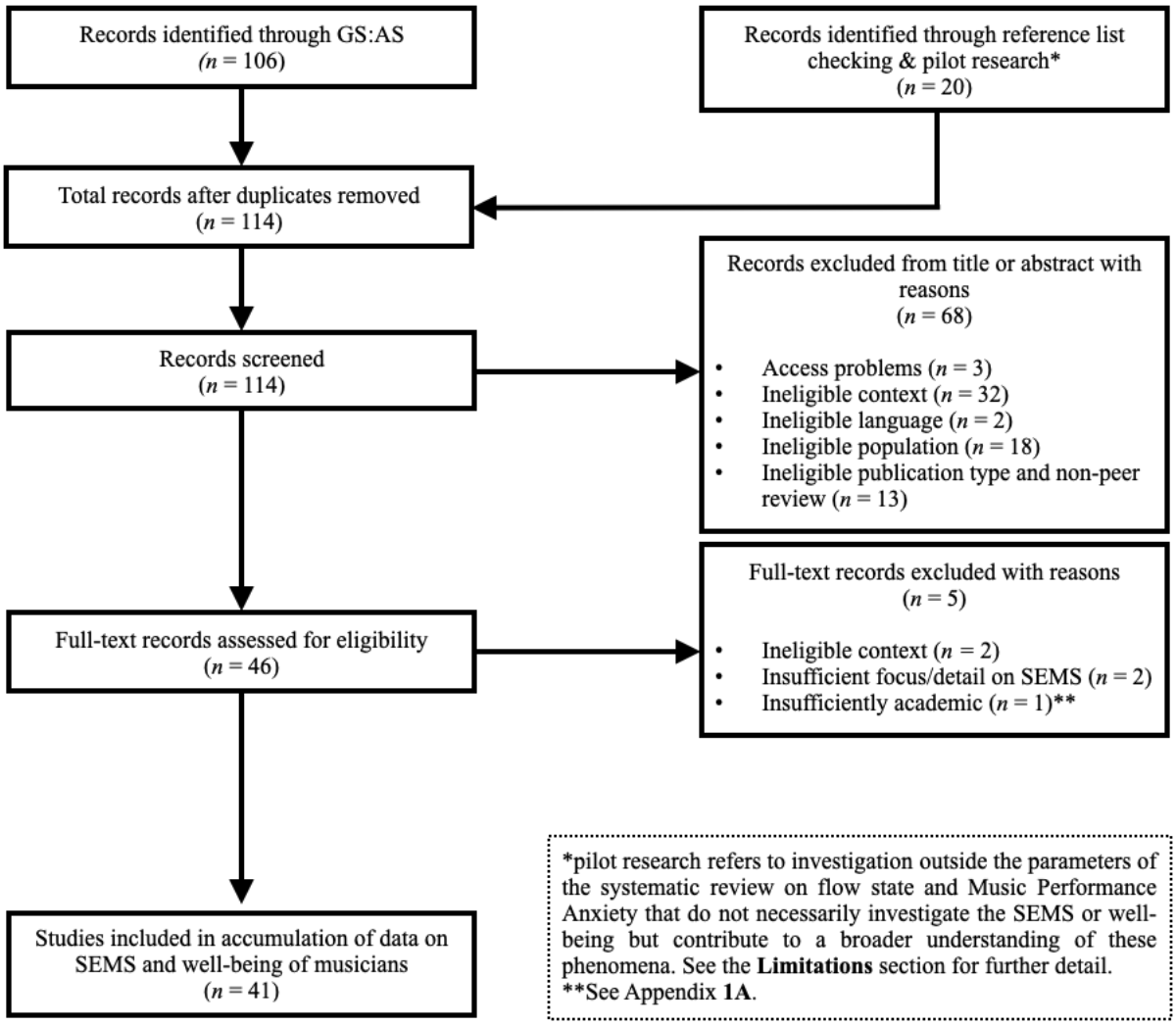

Figure 1. *Flow diagram for study inclusion (Moher et al., 2009; Willis et al., 2019)*

3.2 Summary of studies.

The review foregrounded a network of theoretical associations between SEMS as related to performance and achieving flow. The paucity of empirical data retrieved meant that only a theoretical baseline of emotional fluctuation throughout the chronology of musical performance could be formulated. Conceptual models of similar nature were identified in relevant areas of motivation theory (Hallam, 2006) and MPA (Kenny, 2011; Papageorgi et al., 2007); justifying another theoretical contribution to the field.

The 41 studies included fell into three interleaving categories: reviews and suggestions of MPA treatment; investigations of flow experiences; and pedagogical exhortations regarding motivation theories and the former categories.

The literature concurred on the following themes. (**Theme 1**) Musical careers are generally associated with poor psychological health, both scientifically (Brodsky, 2006; Diehl, 2016; Kenny, 2011; Kenny et al., 2014; Kirchner, 2011; Lockwood, 1989; MacArthur, 2008; Swart, 2013; Willis et al., 2019) and stereotypically (Ascenso et al., 2017; Guster, 2013; McGrath, 2016). (**Sub-theme 1.1**) MPA exists in comorbidity as both a contributor to and a symptom of this psyche (Cohen & Bodner, 2018b; Goren, 2014; Kenny, 2011; Kirchner, 2011; Likar & Raeburn, 2009; McAllister, 2013), often resulting in (**Sub-theme 1.2**) maladaptive coping mechanisms not infrequently involving licit and/or illicit substance abuse (Goren, 2014; Jordan, 2016; Kenny, 2011; Likar & Raeburn, 2009). (**Theme 2**) MPA is common (Cohen & Bodner, 2018a; Goran, 2014; Jordan, 2016; Kenny, 2011; Kirchner et al., 2008; Kirchner, 2011; Likar & Raeburn, 2009; MacArthur, 2008; McAllister, 2013) in both music students and professionals; (**Sub-theme 2.1**) has been historically (Diehl, 2016) and is presently underreported (Jordan, 2016; Kenny, 2011; Likar & Raeburn, 2009; McGrath, 2011); and (**Sub-theme 2.2**) exists antithetically with confidence/self-esteem (Guster, 2013; Kenny, 2011; Kirchner et al., 2008; McAllister, 2011; McGrath, 2012; Smith, 2014; Swart, 2013). Overall, (**Sub-theme 2.3**) the most frequently recognised contributing factor to MPA is the fear of negative evaluation (Cohen & Bodner, 2018b; Jordan, 2016; Kenny, 2011; McAllister, 2011; McArthur, 2008; McGrath, 2012); however, there is a consensus that (**Sub-theme 2.4**) MPA experience is highly idiosyncratic to each individual's trait characteristics and life experiences (Breaden Madden et al., 2023; Brodsky, 1996; Cohen & Bodner, 2018b; Diehl, 2016; Hallam, 2006; Jordan, 2016; Kenny, 2011; McAllister, 2013; Millman, 2021; Smith, 2014 Swart, 2013).

(**Theme 3**) All articles that discussed flow referenced optimal/peak performance and (**Sub-theme 3.1**) cited a challenge-skill balance as an important pre-requisite of flow achievement (Ascenso et al., 2016; Breaden Madden et al., 2023; Cohen & Bodner, 2018a, 2018b, 2019; Csikszentmihalyi, 1990; Csikszentmihalyi & LeFevre, 1989; Diehl, 2016; Faber, 2003; Fritz & Avsec, 2007; Fullagar et al., 2013; Gritten, 2019; Guster, 2013; Hallam, 2006; Kenny, 2011; Kirchner, 2011; Kirchner et al., 2008; MacArthur, 2008; de Manzano et al., 2010; McAllister, 2013; Millman, 2021; O'Neill & McPherson, 2002; Park, 2022; Peifer et al., 2014; Smith, 2014; Swart, 2013; Thomson, 2014; Weisling, 2020), with many positing that (**Sub-theme 3.2**) there is an optimal level of psychophysiological arousal that enables flow-state achievement and/or optimal performance (Cohen & Bodner, 2018a, 2018b; Diehl, 2016; Fullagar et al., 2013; Guster, 2013; Hallam, 2006; Jordan, 2016; Kenny, 2011; Kirchner et al., 2008; de Manzano et al., 2010; McAllister, 2013; McGrath, 2012; Millman, 2021; Peifer et al., 2014; Thomson, 2014) - often citing the inverted-u relationship between arousal and performance quality from the Yerkes-Dodson Law (Yerkes & Dodson, 1908). Although, McGrath (2011) and Papageorgi et al. (2007) discuss optimal arousal levels without referring to flow theory; and Smith (2014), Thomson (2014) and Weisling (2020) are outliers in the inverse respect. (**Sub-theme 3.3**) There is empirical evidence that flow and MPA are antithetical experiences (Cohen & Bodner, 2018b; Kirchner et al., 2008) and a consensus that this is the case (Fullagar et al., 2013; Cohen & Bodner, 2018a, 2019; Csikszentmihalyi, 1975; Swart, 2013), giving rise to the suggestion that enabling flow may prove an effective treatment for MPA (Kirchner, 2011) as well as one study adopting this approach with promising results (Cohen & Bodner, 2018a). (**Sub-theme 3.4**) Flow experiences and/or successful performances are also theorised to increase intrinsic motivation (Ascenso et al., 2017; Cohen & Bodner, 2018a; Faber, 2003; Guster, 2013; Hallam 2006; Jordan, 2016; Kenny, 2011; de Manzano et al., 2010; Nakamura & Csikszentmihalyi, 2016; Papageorgi et al., 2007) and (**Sub-theme 3.5**) confidence (Ascenso et al., 2017; Csikszentmihalyi, 1990; Faber, 2003; Kirchner, 2011; McAllister, 2012; Millman, 2021; Papageorgi et al., 2007).

Detailed discussion of (**Sub-theme 3.6**) flow experiences increasing levels of enjoyment is forthcoming; but the literature definitively indicates a euphoric disassociation, or "transient neglect" (de Manzano et al., 2010, p.302), synchronous with the achievement of flow state, as well as longer-term elevation of the PA SEMS and overall PA. MPA is linked with NA and SEMS depressed mood-state and situational stress (MPA is presently addressed within state anxiety as mentioned) and may exist in comorbidity in the longer-term with other severe psychological disorders (further detail forthcoming). Although it was not possible to empirically validate the emotional impact of a flow state performance given the lacuna of precise arousal levels of NA, PA or the SEMS at each chronological marker, theoretically founded inferences can be made. A higher corroboration between studies is interpreted as having a stronger theoretical basis.

3.3 Quantitative studies retrieved.

In a study testing a "two-pronged approach" to facilitate optimal performance (reducing MPA; increasing flow), Cohen & Bodner (2018a) reported relevant quantitative NA values, derived from the self-report Positive Affect Negative Affect Schedule (PANAS; Watson et al., 1988). Cohen and Bodner did deploy other self-report measures which would have been useful in this systematic review; but they do not report them in this publication. Their results suggest that NA does not vary pre- to post-performance **(Table 4)**. The only other study that provided

quantitative values was Breaden Madden et al.'s (2023), but these were median values not applicable to the formulation of a baseline for emotional fluctuation.

Table 4. *Cohen & Bodner (2018a,p. 531 graphs) : Visibly deduced mean score, 1-5 scale.*

Point of measurement	NA Levels	
	Pre-performance	Post-performance
Week 2, performance 1	≈ 2.20	≈ 2.20
Week 10, performance 2	≈ 1.60	≈ 1.40

3.4 Synthesis of results: Data retrieved on PA, NA and SEMS relationships.

3.4.1 PA-NA Relationship.

PA and NA are moderately and negatively correlated (Merz & Roesch, 2011; Watson et al., 1999). With reference to music performance, de Manzano et al. (2010) posit that positive valence can distract from negative or even painful stimuli. It is thought that the powerful emotional impact of music may be so because it evokes certain (positive) emotions whilst synchronously inhibiting incompatible ones (Blood et al., 1999; Hallam, 2006). PA and NA are treated in moderate negative association.

3.4.2 SEMS relationships: conceptual framework.

All SEMS bear theoretical relationships affecting their independent arousal levels. Literature referencing flow is clarified with the relevant experiential characteristic in brackets. It is assumed that "conceptually similar affective states… represent the same dimension" (Merz & Roesch, 2011, p. 2).

3.4.2.1 PA SEMS relationships: mutual positive associations.

Enjoyment-motivation. Hallam (2006) cites Gellrich et al. (1986) who coined a tri-dimensional general-achievement motivational model for music. One aspect of this model is 'sensual-aesthetic motivation,' which links positive aesthetic and sensual experiences (enjoyment) of music to motivation, denoting a positive association. Hallam also cites Blood & Zatorre's (2001) findings that positive emotional responses to (i.e., enjoyment of) music elicited an increase in brain activity in areas that were associated with "motivationally important stimuli" (Hallam, 2006, p. 25), an empirical finding signposting a mutual positive association. Hallam (2006) also cites Bandura (1989) who posits that motivation will "peak" when someone "feels competent [i.e. confident] but challenged" (p. 149). Faber (2003) finds that the love (enjoyment) of music is inherently motivating. Fritz & Avsec (2007) posit that flow (intrinsic enjoyment) cannot be achieved without motivation.

Motivation-confidence. Faber (2003) notes that an intrinsic motivation contributes to a positive sense of self; enabling one to feel confident and successful in life. Faber's study also found that having the motivation to take part in musical activity boosted confidence in other areas of life. O'Neill & McPherson (2002) cite Hackett (1995) in postulating that a perception of competence (i.e., confidence) in an activity is powerful in influencing motivation. McAllister (2012) states that "people might be motivated by… self-confidence in a piece of skill" (p. 16).

Confidence-enjoyment. An increase in confidence, achieved by repeated exposure to low-risk performance scenarios (systematic sensitisation), may be effective for making musicians see performance as enjoyable (Jordan, 2016; Osborne & Kenny, 2008). Millman (2021) discusses Wulf and Lewthwaite's (2016) OPTIMAL Theory of Motor Learning; a major element of which is 'learner choice and positive expectations,' implying a confidence ('expectation') that the performer will experience the performance as 'positive' and therefore enjoy it. Smith (2014) cites Csikszentmihalyi's original theory of flow (1990), which states that individuals who are overly self-conscious (and therefore lack confidence) are not able to achieve flow states (intrinsic enjoyment). Park (2022) verified this in his finding that having more experience and confidence positively influenced the level of flow (intrinsic enjoyment) achieved in his study on teaching artists.

3.4.2.2 NA SEMS relationships: mutual positive associations.

State anxiety-situational stress: mutual positive association/ conceptually similar. Steptoe (1987) found a significant correlation between MPA and a musicians' career stressors (which cause chronic and situational stress).

MacArthur (2008) posits that the pressure to achieve excellence in musical careers elicits both "extreme stress and anxiety" (p. 1). Hallam (2006) uses anxiety and stress interchangeably, implying they are conceptually similar. Peifer et al. (2014) note that the transactional stress model (Lazarus, 1984) and the flow model (Csikszentmihalyi, 1990) are related in the challenge-skill balance aspect (**Sub-theme 3.1**). If not balanced, the transactional stress model states that this results in stress; whilst in the flow model it results in anxiety. Diehl (2016) places performance stress and music performance stress syndrome within MPA as a broader phenomenon. These SEMS are henceforth treated as conceptually similar and in mutual positive association.

Situational stress, state anxiety and depressed mood-state: potential for comorbidity. Kenny (2011) posits three types of MPA; the third of which is accompanied with depression. Depressed mood-state can exist in comorbidity with MPA and situational stress, intensifying these conditions.

The three NA SEMS are treated as existing in mutual positive associations due to the potential for comorbidity.

3.4.2.3 Inter-affect SEMS relationships.

Confidence-state anxiety: antithetical association. (**Sub-theme 2.2**) Anticipatory anxiety, as defined by Swart (2013), is anxiety in precise anticipation of something going wrong. This implies a lack of confidence in this precise activity. Faber (2003) found that a lack of confidence correlated with increased anxiety. There exists a tetra-manifestation model of MPA: physiological, psycho-emotional, behavioural and cognitive (Hallam, 2006; Jordan, 2016; Kenny, 2011; McAllister, 2013; McGrath, 2012, 2016). The cognitive manifestation of MPA directly results in a loss of confidence. Guster (2013) also posits that a "confident public persona" (p. 219) is necessary to overcome anxiety. Steptoe (1987) found a significant negative correlation between MPA and extraversion (a core element of which is self-confidence). Kirchner (2011) found that creating long-term goals had the symbiotic effect of minimising anxiety and increasing confidence. Kenny (2011) cites Bandura's (1991) Self-efficacy theory - anxiety will increase as self-efficacy beliefs (i.e. confidence) decrease(s).

Confidence-depressed mood state antithetical association. Faber (2003) found that lack of confidence correlated with increased feelings of depression and personal problems. An increase in confidence as a result of success can lead to the conceptualisation of a "positive possible future self," (Hallam, 2006, p.146; Markus & Ruvolo, 1989) the optimism of which inhibits depression as a mood-state strongly associated with rumination (Kenny, 2011).

Depressed mood-state-enjoyment; state anxiety-enjoyment antithetical associations. Especially in relation to music performance, Guster (2013) found that a flow state (intrinsic enjoyment) can "purge" (p. 147) feelings of depression and severe anxiety in professionals. MPA (state anxiety) and flow (intrinsic enjoyment) are understood as antithetical (**Sub-theme 3.3**).

3.5 Summary of results.

All NA SEMS are mutually and positively associated; all PA SEMS are mutually and positively associated. Although NA and PA are moderately negatively associated, inter-affect SEMS associations can influence individual SEMS arousal levels within these broader frameworks. The following discussion posits a conceptual framework, a theoretical baseline, based on these relationships and retrieved theorised fluctuations in the SEMS and affect through the chronology of a performance.

4. DISCUSSION

4.1 Summary of evidence: theoretical baseline of SEMS fluctuations.

4.1.1 General psyche: assumed moderate NA and PA.1

The assertion that musical careers are associated with poor psychological health (**Theme 1**) is scientifically grounded; and the general illustration of NA and the NA SEMS at a conceptual general psyche is worrying. Diehl (2016) cites Brodsky (2006), who found musicians to be among the top five occupational groups at risk of mental illness. Kenny (2011) cites Lockwood (1989) and the International Conference of Symphony and Opera Musicians (ICSCOM; 1986) which found: 17% of orchestral musicians in the United States suffer from depression; 13% from acute anxiety; and 14% from sleep disturbances. Numbers for anxiety are moreover likely to be underreported (**Sub-theme 2.1**) as per this historic trend (Diehl, 2016). Swart (2013) corroborates that musicians are more prone to anxiety and depression; and posits that they are more prone to obsessive-compulsive disorder, interpersonal sensitivity and hostility.

[1]General Psyche, as per **Table 1**, is defined as at between 2 and 7 days pre-performance.

Despite this context, this investigation's interest in flow state achievement does not allow for a theoretical baseline of SEMS fluctuation across the chronology of a performance to be chartered for individuals with high NA, given that situational stress and state anxiety (MPA) exist within this affective framework and are antithetical with a flow state (**Sub-themes 2.2; 3.3**). A moderate level of anxiety, on the other hand, can be overcome by achieving flow (Guster, 2013; Kenny, 2011) and may even "facilitate performance skills" (Hallam, 2006, p.103; Hamann, 1982; Hamann & Slobaje, 1983) if trait anxiety (anxiety at general psyche) is insignificant (Kenny, 2011). Moderate levels for all SEMS are assumed at general psyche under this pretext.

The theoretical baseline of SEMS fluctuation throughout the chronology of a music performance is presented as **Figure 2 (**overleaf). The theoretical baseline indicates a positive emotional cycle stimulated by high-flow state achievement in a performance

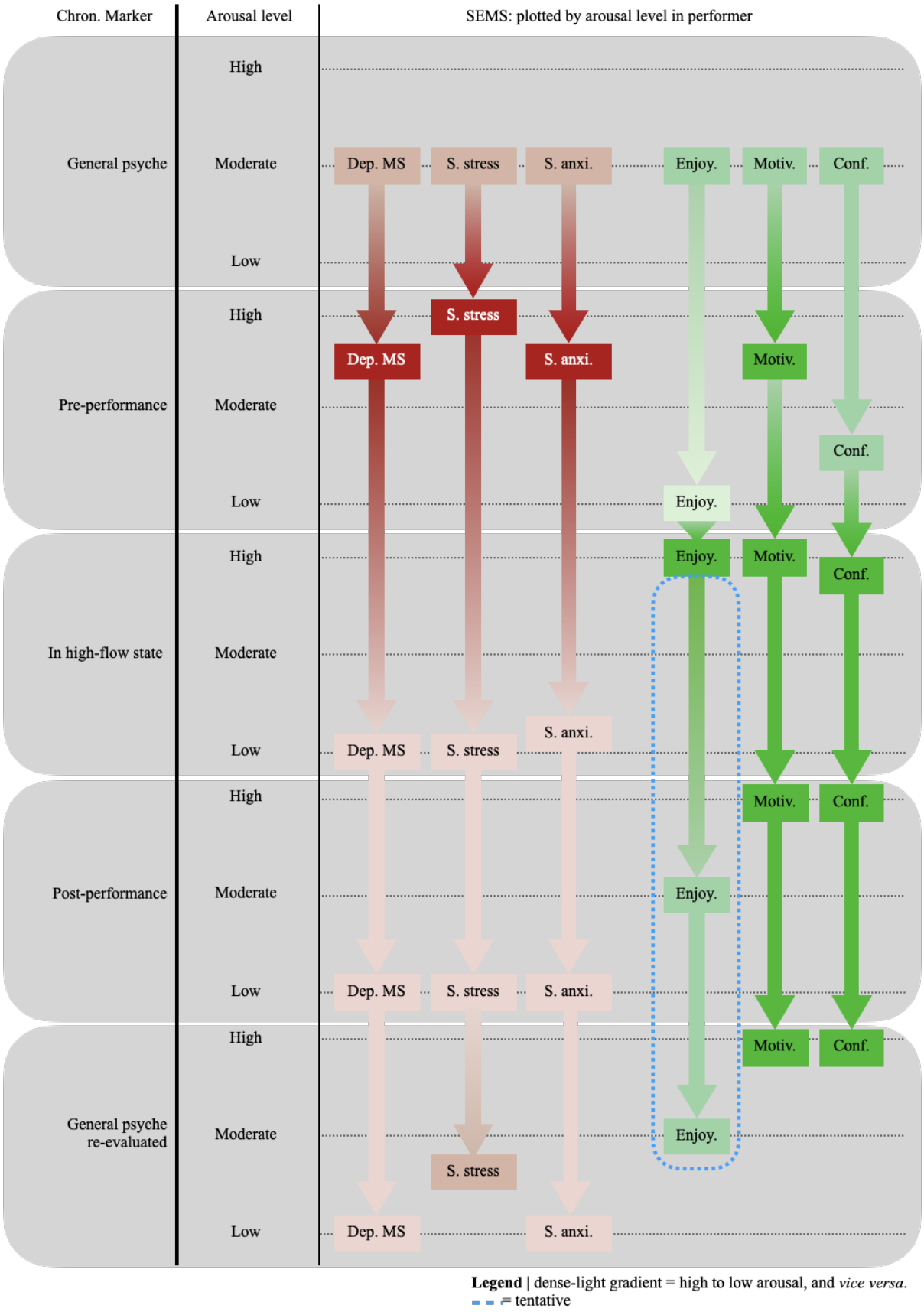

Figure 2. *Theoretical baseline of SEMS fluctuation throughout the chronology of a high-flow state performance.*

4.1.2 Pre-performance.[2]
Known fluctuations:
(i) Experience of MPA is an increase in state anxiety. State anxiety increases to moderately high. **(ii)** When performing in front of an audience, motivation increases. This increase may stem from two principal origins. 'Internalised fear-based motivation' is "the using of one's imagination to create a vision of worst-case scenarios… for the purpose of motivating oneself out of fear to act with a sense of urgency to prevent the imagined outcome" (Smith, 2014, p. 270). Pre-performance, this type of motivation increases as a result of the perceived sense of urgency to prevent the worst-case scenario (a poor performance). On the positive spectrum, because of the assumption of flow achievement, clear performance goals will have been set, which is motivating (Kirchner, 2011; McAllister, 2012). Motivation increases to moderately high.

Association-dependent fluctuations:
(i) Performers do not experience enjoyment synchronous to state anxiety at moderately high levels - they are antithetical experiences. Enjoyment drops to low. **(ii)** Depressed mood-state increases as antithetical to enjoyment and with state anxiety and situational stress (mutual positive associations). **(iii)** Increase in state anxiety (MPA) causes increase in situational stress (conceptually similar states). **(iv)** Increase in state anxiety causes decrease in confidence (antithetical association). **(v)** Increase in motivation maintains confidence levels (mutual positive association) at moderately low and thus prevents state anxiety from increasing to high.

4.1.3 In high-flow state performance.
Known fluctuation: Experiential characteristics of flow places PA SEMS at high (loss of self-consciousness treated as positively associated with confidence); a euphoric disassociation (previously discussed) places NA SEMS at low. Music performance can act as a transcendental expressive outlet (Guster, 2013; Park, 2022); even for individuals who have experienced emotional trauma ("a toxic condition, mixture of intense anxiety, absolute helplessness and a loss of control;" Swart, 2013, p. 387).

Association-dependent fluctuation: Gritten (2019) posits anxiety could increase during performance due to attempted adherence to performance practices. In a flow state, any increase in anxiety must be minimal; but is accounted for, with an antithetical decrease in confidence.

4.1.4 Post-performance.[3]
Known fluctuations:
(i) *Motivation and confidence are positively impacted by flow-state* (**Sub-themes 3.4; 3.5**) and remain high. **(ii)** State anxiety "reduce[s] rapidly" post-performance (Kenny, 2011, p. 146) in both cognitive and somatic manifestations (**Figure 3** taken from Kenny, 2011, p. 146; McNally, 2002), reducing to low. **(iii)** Depressed mood-state can be "purged" by musical performance, both during and after (Guster, 2013, p. 142) and remains low. **(iv)** Situational stress remains low: there are no immediate stressors after a flow state performance. The overall inhibition of the three NA SEMS is moreover justified by the moderately negatively correlated PA-NA relationship.

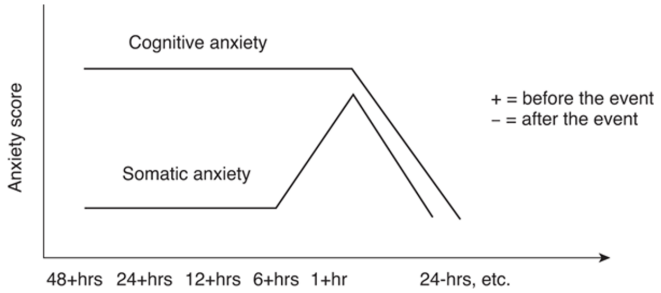

Figure 3. *Taken from Kenny (2011, p.146; McNally, 2002).*

Tentative fluctuation of enjoyment:
Little was retrieved about enjoyment levels post-performance. Park (2022) found that "after-flow could be positive or negative because the motivation to pursue the [performance] still exists, but the [performance] has ended" (p. 195). Kirchner et al. (2008) had one participant who noted a great "swell of relief and sorrow" post-performance

[2]Pre-performance, as per **Table 1**, is defined as immediately before the performance.

[3]Post-performance, as per **Table 1**, is defined as immediately after the performance.

(p. 62). Enjoyment is tentatively reduced to moderate; motivation and confidence preventing any further decrease (positive association).

4.1.5 General psyche re-evaluated.[4]

Known fluctuations:
(i) Motivation is positively impacted by flow state/ positive performance achievement in the longer term (Ascenso et al., 2016; Cohen & Bodner, 2018a, 2018b, 2019; Csikszentmihalyi & LeFevre, 1998; Guster, 2013; Nakamura & Csikszentmihalyi, 2016; Papageorgi et al., 2007). **(ii)** Flow positively impacts confidence in the long-term (Faber, 2003; Hallam, 2006; Papageorgi et al., 2007). Motivation and confidence increase reciprocally (mutual positive association). **(iii)** State anxiety is low per **Figure 3** (p. 10); and because confidence is high (antithetical relationship).

Tentative fluctuation of enjoyment:
Enjoyment is unchanged from general psyche to general psyche re-evaluated because there is no data on how enjoyment is affected in this context. The continuity of motivation, confidence, (mutual positive associations) depressed mood-state and state anxiety (antithetical association) logically supports enjoyment as stable.

Association-dependent fluctuation:
Depressed mood-state is low as there is insufficient cause to justify its re-attainment at general psyche levels given its antithetical relationship with motivation and there being high PA overall (also moderately negatively correlated with overall NA).

Deduced fluctuation of situational stress:
Occupational demands of performing musicians (Willis et al., 2019) mean that the performer will be re-exposed to these demands by the time their general psyche is re-evaluated. Situational stress increases to moderately low.

4.1.6 Summary. The theoretical baseline suggests a flow-state musical performance has a positive impact on psychological health. The baseline can be taken as what *should* theoretically occur consequent to a successful musical performance with high flow achievement.

4.2 Further evidence: impediments to the positive emotional performance-induced cycle.
Professional musicians often experience high flow (Cohen & Bodner, 2018b) so should be in a positive high-flow performance cycle, as indicated by the theoretical baseline. This section discusses why this is not the case (**Theme 1**) as revealed by the literature in the systematic review.

4.2.1 Negatively valanced strategies to secure positive performance. Breaden Madden et al. (2023) found that individuals with high trait neuroticism engage in conscious recall in order to selectively up-regulate negative emotions such as anxiety, gloom or fear to enhance their musical performance. This is similar to Smith's (2014) conceptualisation of internalised fear-based motivation in that negatively valanced strategies are used in an attempt to secure a positive performance. These strategies may inhibit PA pre-performance and affect the extent to which a flow state is achieved, impacting the potential for a positive effect on the psyche.

4.2.2 MPA and maladaptive coping. Although extreme MPA can lead to the abandonment of musical careers (Kenny, 2011), the elected coping mechanism may be what causes a disruption of the positive cycle of flow-state achievement. A common coping mechanism for MPA is substance abuse (**Sub-theme 1.2**). Use of beta-blockers is widespread (Brandfonbrener, 1990; Diehl, 2016; Jordan, 2016; Kenny, 2011; McGrath, 2011; Swart, 2013), often without medical supervision (Cohen & Bodner, 2019; Kenny et al., 2014). It is established that beta-blockers can suppress physiological arousal (Kenny, 2011) and thus have potential to impede the positive flow performance cycle in-flow (physiological arousal is inextricable with an emotional performance experience). Alcohol, also a common coping mechanism (Goren, 2014; Jordan, 2016; Kenny, 2011), is a depressant and can elevate negative affect at general psyche re-evaluated. Performing musicians should refer to treatment strategies endorsed by MPA research, including yoga and meditation (McGrath, 2012; Kenny, 2011), in order to perpetuate the positive influence of flow state.

4.2.3 Comorbidity and MPA's resultant idiosyncrasies. Kenny (2011) posits three models of MPA, each of which is individual and based on life experiences and/or traits (**Sub-theme 2.4**). A full discussion of these is beyond the scope of this paper, but **Figure 4** is Kenny's representation depicting each category of MPA: (i) focal (isolated)

[4]General psyche re-evaluated, as per **Table 1**, is defined as between 2 and 7 days after the performance.

MPA; (ii) MPA as or with Social Anxiety Disorder (SAD); (iii) MPA as panic disorder with or without depression as existing in comorbidity with other psychological disorders (Kenny, 2011, p. 65). This model develops Plaut's (1990) Psycho-analytic theory, suggesting MPA as a manifestation of underlying trait conditions. It is furthermore a confirmation of Brandfonbrener's (1999) postulation that MPA cannot be considered in isolation (Hallam, 2006). Trait conditions could inhibit increases in PA or elevate NA at all of the chronological markers in the theoretical baseline. All the disorders in **Figure 4** are dimensional phenomena (American Psychiatric Association, 2013); highlighting the kaleidoscopic potential for diversity in emotional fluctuation. The classification of MPA severity and its idiosyncrasies is therefore essential for forming treatment strategies (Brodsky, 1996; Diehl, 2016; Jordan, 2016; Kenny, 2011).

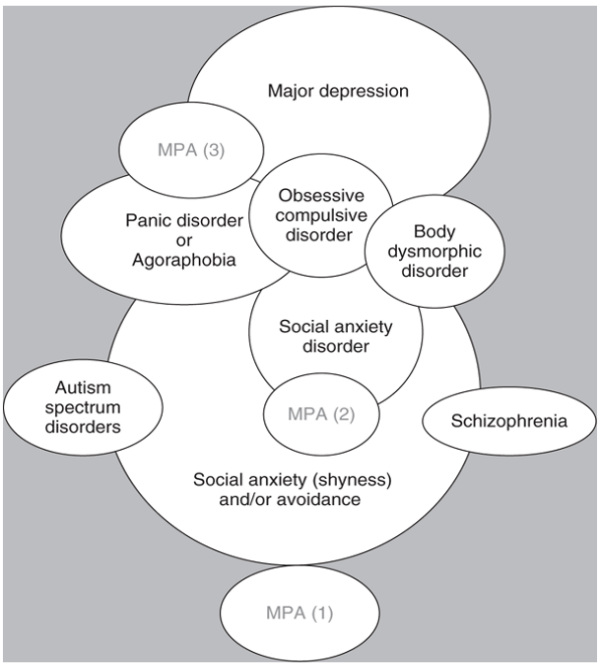

Figure 4. *MPA: rife potential for comorbidity, taken from Kenny (2011, p.65).*

4.3 Limitations.

This systematic review was carried out with reference to the PRISMA model (Moher et al., 2009). One deviation from this model was the employment of 'pilot research.' Google Scholar: Advanced Search (GS:AS) did not produce all conceivably relevant articles, given that some articles found in pilot research, before the systematic review, were not retrieved. This is despite these articles containing the keywords within the search parameters (**Table 2**). GS:AS evidently does not fully catalogue all of the relevant articles for this study. Future research should use more trustworthy, reliable databases (e.g. EBSCOHost, OvidSP, Scopus); such as Willis et al. (2019). However, it should be noted that the Willis et al. systematic review was carried out with a full team of specialists; enabling a review of over 230 articles - a somewhat unobtainable feat for one undergraduate student. The present systematic review revealed sufficient material to charter a theoretical baseline for emotional fluctuation throughout the chronology of a performance. No prior research has reported results for SEMS, PA or NA fluctuations relevant to flow state achievement through this chronology.

Study publication bias (Dwan et al., 2013) is not a limitation of this systematic review as a required submission as part of an Undergraduate programme. Outcome reporting bias (Dwan et al., 2013), however, is a limitation of this systematic review as it was precisely directed to produce a baseline for the SEMS. Other emotive and/or cognitive manifestations, such as fear or shame, were neglected. Other valanced descriptors can exist within the network of musical performance and flow state impact. Nonetheless, the rationale for SEMS selection was explained in the **Introduction**. Future research in this area may start with establishing empirical connections between adjectival descriptors of emotion and therein justify a similar search strategy.

4.4 Conclusions.

This systematic review yielded a network of SEMS relationships. These were then applied to current knowledge of SEMS, PA and NA fluctuation related to MPA and flow state, enabling the formulation of a theoretical baseline for SEMS arousal level fluctuation through the chronology of a high-flow state musical performance. Cohen & Bodner's (2018a) study contradicts the theoretical baseline: showing no variation in NA levels pre- to post-performance. However, this is an isolated finding in the theoretical context, possibly due to the small sample size in Cohen & Bodner's study. The theoretical baseline, formulated by a synthesis of 41 pieces of relevant literature, rejects that there is no NA variation pre- to post-performance. The theoretical baseline indicates that a high-flow state performance should elicit increases in the PA SEMS; as well as decreases in the NA SEMS. This applies in the short and long-term (post-performance; general psyche re-evaluated). Theoretically, performing music well *should* elicit positive emotional reward.

Coping strategies at the level of the individual; performance enhancement strategies; and the kaleidoscopic idiosyncrasies of MPA may be perceived to invalidate the theoretical baseline, which indicates a positive emotional cycle. However, as postulated in the rationale, the baseline allows for abnormal emotional fluctuations to be identified via comparison. The idiosyncrasies and dimensions of MPA severity, and musical career experiences more broadly, can be more readily defined and categorised through observations made in emotional fluctuation if this theoretical baseline is empirically verified and if future research deploys more reliable measurements (other than self-report) for the SEMS; and potentially other valanced adjectival descriptors. A paucity of empirical data on affect fluctuation per the chronological markers highlights the current absence of scientific interest in the emotional continuum of a musical performance. This absence should be rectified, given that performing is a frequent emotional climacteric in a musical performance career and that these careers are associated with poor psychological health (**Theme 1**).

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APPENDIX

Records included and excluded in systematic review reviewed at full text

Records included in systematic review

Literature Title	Main Author(s)	Date	Method of retrieval
Understanding the Wellbeing of Musicians Through the Lens of Positive Psychology	Ascenso	2017	Pilot research
Music Performance Anxiety Reconceptualized: a critique of current Research Practices and findings	Brodsky	1996	RL Check
In the Wings of British Orchestras: A multi-episode interview study among symphony players.	Brodsky	2006	Pilot research
The relationship between flow and music performance anxiety amongst professional classical orchestral musicians	Cohen & Bodner	2018	RL Check
Flow and music performance anxiety: The influence of contextual and background variables	Cohen & Bodner	2019	Pilot research

Music performance skills: A two-pronged approach – facilitating optimal music performance and reducing music performance anxiety	Cohen & Bodner	2018	RL Check
Flow: The psychology of optimal performance	Csikszentmihalyi	1990	Pilot research
Play and intrinsic rewards	Csikszentmihalyi	1975	RL Check
Optimal experience in work and leisure	Csikszentmihalyi	1989	RL Check
The psychophysiology of Flow during piano playing	De Manzano	2010	RL Check
Stage fright: A topical guide for singers concerning MPA literature	Diehl	2016	Systematic review search
Motivational and developmental stages in piano study	Faber	2003	Systematic review search
Experience of flow and subjective well-being in music students	Fritz	2007	Pilot research
Challenge/Skill Balance, Flow and Performance Anxiety	Fullagar	2013	Pilot research
A meta-analysis of nonpharmacologic psychotherapies for music performance anxiety. PhD Diss	Goren	2014	Systematic review search
Dismantling the demands of performing	Gritten	2019	Systematic review search
Tacking the Intangible: Contemporary Classical Pianists on Elusive Aspects of Music-Making	Guster	2013	Systematic review search
Music Psychology in Education	Hallam	2006	Systematic review search
How undergraduate music schools address music performance anxiety: A multiple case study.	Jordan	2016	Systematic review search
The Psychology of Music Performance Anxiety	Kenny	2011	Systematic review search
Psychological well-being in professional orchestral musicians in Australia: A descriptive population study	Kenny	2014	RL Check
Incorporating flow into practice and performance	Kirchner	2011	Systematic review search
The Relationship between Performance Anxiety and Flow	Kirchner	2008	RL Check
Performance Anxiety: A Resource Guide: read on for an overview of a broad range of good resources for combatting performance anxiety	Likar & Raeburn	2012	Systematic review search
Medical Problems of Musicians	Lockwood	1989	RL Check
The Drive to Strive: Exploring the Experiences of Elite-level adolescent performers	MacArthur	2008	Systematic review search
Emotional cherry picking: the role of personality and goal orientation in selective emotion regulation for musical practice	Breaden Madden	2023	Systematic review search
The Balanced Musician: Integrating Mind and Body for Peak Performance.	McAllister	2013	Systematic review search
Music performance anxiety therapies: A review of the literature.	McGrath	2011	Systematic review search
Performance Anxiety Strategies: A Musician's Guide to Managing Stage Fright.	McGrath	2016	Systematic review search
Motivation in The Science and Psychology of Music Performance	O'Neill	2002	RL Check
A deliberate practice loop for music performance training.	Millman	2021	Systematic review search
The Experience of Flow: Theory and Research	Nakamura & Csikszentmihalyi	2016	RL Check
A conceptual framework for understanding music performance anxiety	Papageorgi	2007	RL Check
Artistic Experiences in Music Performing and Teaching: A Flow Study with Teaching Artists. PhD Diss.	Park	2022	Systematic review search
The relation of flow-experience and physiological arousal under stress — Can u shape it?	Peifer	2014	Pilot research

Using the expressive arts to facilitate group music improvisation and individual reflection: Expanding consciousness in music learning for self-development.	Smith	2014	Systematic review search
Overcoming adversity: Trauma in the lives of music performers and composers	Swart	2013	Systematic review search
Training for Performance: Lessons from Sports Psychology Applied to Musical Training	Thomson	2014	Systematic review search
Risk and Expression: Physical and Material Risk States in Computational Music Practices.	Weisling	2020	Systematic review search
The Relationship Between Occupational Demands and Well-Being of Performing Artists: A Systematic Review	Willis et al.	2019	Pilot research

Records excluded from systematic review

Literature Title	Main Author	Date	Reason for exclusion
Making in the Moment: The Dynamic Cognition of Musicians-in-action.	Kevin J. Ryan Jr.	2019	Insufficient focus on SEMS and affective exprience: study focusses on cognitive processes facilitating performance, placing no emphasis on affect.
Proceedings of the 23rd International seminar of the ISME Music in Schools and Teacher Education Commission (MISTEC)	Ruthmann & Bowe	2020	Insufficient focus on SEMS throughout the chronology of a music performance: proceedings are from a virtual seminar where discussion of how to improve children's music education is the focus. Though motivation, confidence, enjoyment are mentioned they cannot be attributed to a music performance.
Finding flow in piano practice	Gregory Wang	2021	Insufficiently academic: PhD dissertation is 39 pages and cites only 29 references.
Waking Up Into the Moment: Temporal Awareness as a Primary Composable Parameter of Music	John Rot	2021	Ineligible context: study concerned with composition, not performance.
Torrent: Integrating Embodiment, Physicalization and Musification in Music-Making	Pon et al.	2017	Ineligible context: concerned with composition, not performance.