

Music in dreams: Characteristics in musicians and non-musicians

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Summary. Musical dreams are those in which music is listened to, spoken about or interpreted. Although such dreams have inspired famous compositions, their characteristics are not clear. This study aimed to determine the prevalence of musical dreams, explore some phenomenological characteristics and establish their relationship with musical habits among professional musicians (PMs), empirical musicians (EMs) and nonmusicians. A 15-item survey was conducted to evaluate the frequency of music in dreams, familiarity of the sounds, speed of music and type of sounds that made up individuals' musical dreams. PMs and EMs were also assessed on type of instrument, years of experience and weekly practice time on an instrument. For the qualitative variables, absolute frequencies and percentages were obtained. For age, the median and IQR were presented according to the distribution defined by the Shapiro-Wilk test, and their influence on the experience of musical dreams was evaluated by means of the Mann-Whitney U test. The chi-square test was used to evaluate differences between qualitative variables. A total of 496 responses were obtained. A total of 90.7% of PMs had dreamed of music at some point in their lives, while 83% of EMs and 72.5% of the nonmusicians had done so ($p < 0.001$). Those who had musical experience between 5 and 10 years reported a prevalence of 90.5% of musical dreams, while those who had been playing for less than 5 years reported a prevalence of 75% ($p = 0.037$). A total of 41.9% of the PMs reported dreams with unknown music, while 7.5% of the nonmusicians reported this type of dream ($p < 0.001$). PMs have a higher prevalence of musical dreams than other groups. Those with more than 5 years of musical training are more likely to dream of music. Practicing an instrument more than 8 hours per week was related to more musical dreams. The presence of novel musical sounds in dreams was significantly higher for PMs, suggesting a relationship between dream creativity and its possible influence on waking musical compositions.

Keywords: Music, dreams, creativity, habits, musicians, dreaming

1. Introduction

We generally dream of visual images (Nir & Tononi, 2010). The famous book by Sigmund Freud, *The Interpretation of Dreams*, provides a vast description of the dreamlike visual symbology in dreams without making any reference to the presence of music in dreams (Freud, 1955). Nor is it frequent to find mentions of this phenomenon in the work of neuroscientists such as Allan Hobson, author of *Dreaming: An Introduction to the Science of Sleep* (Hobson, 2003).

The basic definition of a musical dream would be that music is, in some way, the subject of the dream; the dreamer is listening to music, talking about music, playing an instrument or singing (Olbrich & Schredl, 2019). There are two main sources that reveal the presence of music in dreams. First, there are the anecdotes of musical artists who claim

that the inspiration for their compositions has come from dreams. The famous melody of "Yesterday" occurred to Paul McCartney in a dream (Barrett, 2012). Giuseppe Tartini recalled a dream in which the devil played a wonderful sonata, and Richard Wagner dreamed of his opera *Tristan and Isolde* (Barrett, 2012). Keith Richards said he came up with the lyrics and ostinato for "Satisfaction" in a dream (Richards, 2011). "I dream of colors, I dream of shapes, and I dream of sounds," Billy Joel said in an interview with the *Hartford Courant* about his song "River of Dreams" (Lieberman, 2019).

The second source that reveals the existence of music in dreams is the scientific studies that have been carried out to determine the frequency and characteristics of such dreams. In this regard, two methodologies have been used. The first is a dream diary kept by subjects who record descriptions of their dreams for a period of time. In a study with 425 participants, mostly psychology students who used a dream diary for 14 days, 8% of all remembered dreams contained music, and the frequency of these dreams was significantly higher when the subject played an instrument during the day (König & Schredl, 2021a). Another dream diary study, which compared 1,050 professional musicians with 900 non-musicians over a 30-day period, found that 40.1% of the musicians' dreams contained music compared to 18.2% of non-musicians (Uga et al., 2006). Almost half of the music remembered was new (never heard), which suggests that original music can be created in dreams, as

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asserted by the aforementioned artists. They also found that the frequency of musical dreams was related to the age of the individual when he or she began musical training but not to daily musical activities (Uga et al., 2006).

Quantifying musical dreams through retrospective surveys allows us to determine prevalence. A study with 2929 subjects found that approximately 6% of all dreams include some musical element (Schredl et al., 2015). They found negative correlation between age and musical dreams (the young and the old dream alike); however, showed positive correlations given by higher dream recall frequency, more positive emotional tone, and more positive attitude (if the individual found a dream interesting or not) (Schredl et al., 2015). In another study, 1966 participants completed an online questionnaire about their participation in waking musical activities and the appearance of music in dreams (König et al., 2018). The basic framework for the study was the continuity hypothesis of dreaming, which states that dreams reflect waking-life experiences (Schredl, 2003). König et al. found that the relationship between musical activity during waking hours and the frequency of music dreams is in line with the continuity hypothesis of dreaming. Around 6% of all dreams that people remember included music, and this rate was notably higher for those who engaged more frequently in musical activities like singing, playing an instrument, or actively listening to music. Moreover, music dreams included more positive emotions than dreams in general (König et al., 2018).

To determine if the amount of time spent on musical activities during the day was directly related to the percentage of musical dreams, a group of 144 people, mostly students of psychology, music students and members of a choir, completed questionnaires on activities related to music and musical dreams (Vogelsang et al., 2016). As expected, there was a relationship between the two variables. The participants reported, on average, 12% of their dreams included music (Vogelsang et al., 2016).

Our study aimed to determine the prevalence of musical dreams in a population of professional musicians (PMs), empirical musicians (EMs) and nonmusicians. EMs are those who have learned to play music and develop their musical skills in a self-taught manner, without formal academic training or professional instruction. This learning can occur through practice, imitating other musicians, experimentation, and direct experience.

Likewise, phenomenological characteristics of these dreams were investigated, such as the familiarity of the sounds, the speed of the music and the type of sounds that made up the dream. For the PMs and EMs groups, daytime life variables were also investigated, such as the type of instrument they played, the number of hours they practiced per week and the age at which they began music training.

2. Method

2.1. Participants

A total of 505 surveys were obtained, of which 496 were answered in their entirety for a response rate of 98.2%. Nine surveys were excluded for not having complete or correct information or because the respondents were minors. Before filling out the survey, the participants were told that the objective of the research was to know how the brain remembered music in different settings, particularly through

experiences related to musical dreams. They were assured that their responses would remain anonymous and confidential, and their participation was freely and voluntarily given.

The survey was disseminated through the authors' social networks, and although it did not undergo a strict validation process, the survey was previously tested in a pilot project. The pilot included 15 participants to determine the response times, the ease of understanding the questions, the agreement of the answers and the relevant topics for the research.

2.2. Measurement instruments

Between October 2021 and August 2022, an anonymous online survey was conducted aimed at the general population over 18 years of age. The survey consisted of 15 questions, six of which evaluated sociodemographic variables such as age, gender, education, city of residence, profession, and whether they were an PMs, EMs or not a musician. For those who answered PMs or EMs, three specific questions were asked about musical habits, such as what type of instrument they played (strings, percussion, wind), how long they had been playing the instrument (less than 5 years, between 5 and 10 years, or more than 10 years) and an average number of hours per week they practiced. All respondents, including non-musicians, were asked one question related to their favorite musical genre. Subsequently, the entire sample was asked four questions on phenomenological aspects of the dream content related to the frequency of dreaming of music throughout their lives; if they had dreamed of musical pieces that were known, unknown or modified; if the dreamed songs were instrumental, vocal or mixed; and if they remembered the tempo or speed of the musical piece.

Although this research was not submitted to an ethics committee, we know that since it is an anonymous online survey in which the subjects voluntarily accepted their participation, we can affirm that there was no harm to any person and there will be no harm related to the publication of the information.

2.3. Statistical methods

The normality of the age variable was evaluated with the Shapiro-Wilk test, and because its distribution did not adjust to normality, the median and interquartile ranges were presented as summary measures. For the qualitative variables including gender, schooling, instrument, type of musician, instrument and genre, absolute frequency and percentage were presented.

To compare people who have ever dreamed of music with those who have never done so, the question was asked, "How often do you hear musical fragments as part of your dream?" The Mann-Whitney U test was used to evaluate age differences between the two groups. To make comparisons with qualitative variables, the chi-square test was used, but if the frequency of any of the cells was less than 5, the p value of Fisher's exact test was reported.

Additionally, differences in all variables were evaluated according to the type of musician (PMs, EMs or non-musician) with the same tests to compare with another qualitative variable and with the Kruskal-Wallis test to report the differences by age. Statistical analysis and graphs were performed with Stata version 14 software.

Table 1. General description of the participants according to whether or not they have ever dreamed of music.

Variable	Total (n= 496)	Has not dreamed of music (n=99)	Has dreamed of music (n=397)	Chi square test p value
	n (%)	n (%)	n (%)	
Age (years) ^a	29.5	26	30	0.198
Sex				0.076
Female	251 (50.6)	58 (23.1)	193 (76.9)	
Male	245 (49.4)	40 (16.7)	204 (83.3)	
Schooling				0.5991
High school degree	19 (3.8)	5 (26.3)	14 (73.6)	
Undergraduate studies	202 (40.7)	45 (22.3)	157 (77.7)	
Bachelor degree	83 (16.7)	14 (16.9)	69 (83.1)	
Ongoing postgraduate	26 (5.2)	3 (11.5)	23 (88.5)	
Master degree	166 (33.4)	32 (32.3)	134 (33.7)	
Musical training				<0.001
Professional	97 (19.6)	9 (9.3)	88 (90.7)	
Empirical	190 (37.9)	32 (17.0)	156 (83.0)	
Not a musician	216 (42.5)	58 (27.5)	153 (72.5)	
Years playing the instrument (musicians group)				0.037
<5 years	53 (18.5)	13 (25.0)	39 (75.0)	
5–10 years	64 (22.3)	6 (9.5)	57 (90.5)	
>10 years	169 (59.1)	21 (12.4)	148 (87.6)	
Instrument (musicians group)				0.9641
Strings	185 (66.8)	27 (14.6)	158 (85.4)	
Percussion	66 (23.6)	10 (15.2)	56 (84.8)	
Wind	26 (9.3)	3 (11.5)	23 (88.5)	
Weekly practice (musicians group)				0.1561
<1 hour	98 (34.6)	21 (21.4)	77 (78.6)	
1–3 hours	71 (25.1)	8 (11.3)	63 (88.7)	
3–5 hours	53 (18.7)	6 (11.3)	47 (88.7)	
5–8 hours	26 (9.2)	4 (15.4)	22 (84.6)	
>8 hours	35 (12.3)	2 (5.7)	33 (94.3)	
Genre (musicians and non musicians)				0.5661
Classic	69 (14.0)	15 (21.7)	54 (78.3)	
Electronics	16 (3.2)	2 (12.5)	14 (87.5)	
Indie	45 (9.1)	8 (17.8)	37 (82.2)	
Jazz	45 (9.1)	6 (13.3)	39 (86.7)	
Pop	84 (17.1)	18 (21.4)	66 (78.6)	
Reggae	31 (6.3)	7 (22.6)	24 (77.4)	
Rock	168 (34.1)	30 (17.9)	138 (82.1)	
Tropical	34 (6.9)	11 (32.4)	23 (67.7)	

Note: ^aMedian (IQR), Mann, Whitney U test p value, ^bFisher's exact test p value

3. Results

3.3.1 Sociodemographic data

Information was collected from 496 participants whose median age was 29.5 years and half of the population were women. In terms of educational degree less than a half were undergraduate whereas one third held a master's degree. Rock was the most popular musical genre followed by pop and jazz respectively. Almost seventy percent of the participants in the musicians group played string instruments with a slight majority of participants playing their instruments for more than 10 years and the rest below this range of time.

More than half of the musicians practiced their instrument less than three hours per week. Table 1 details percentages.

3.3.2 Musical training

Regarding the presence of musical dreams, eighty percent of all participants responded affirmatively (at least once at some point in their lives). Within this group, the frequency of musical dreams was significantly higher in PMs with more than ninety percent of the individuals reporting presence of musical dreams ($p < 0,001$). On the other hand, about eighty percent and seventy percent reported musical dreams in the EMS and non-musicians population respectively. (Figure 1).

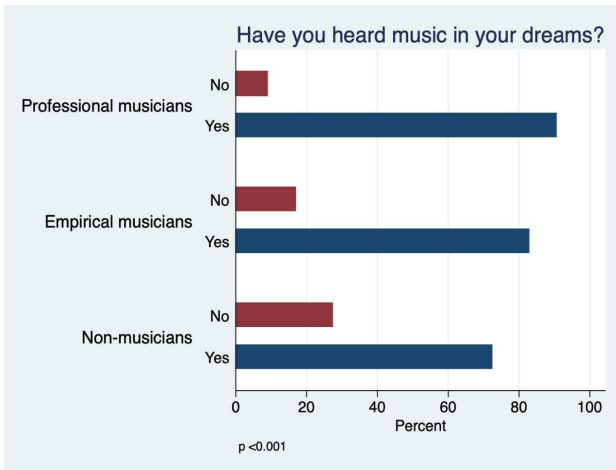


Figure 1. Percentage of people who reported having musical dreams (at least one in their lives) classified by musical training groups.

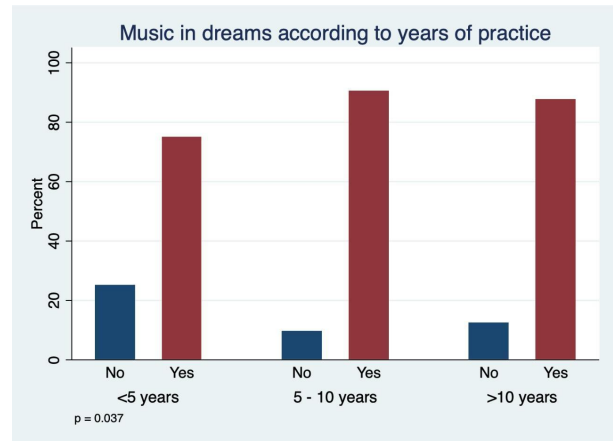


Figure 2. Relationship between musical experience and the presence of musical dreams.

3.3.3 Years of musical experience and hours of weekly practice

Being a musician, both PMs or EMs, was more often associated with presence of musical dreams. Those who had professional or empirical musical experience above five years exhibited higher frequency of musical dreams close to ninety percent, as opposed to the individuals with less than 5 years of practice who had a lower frequency (70.0%) ($p = 0.037$) (Figure 2).

When comparing PMs and EMs, significant differences were observed in terms of the years practicing an instrument; almost 80% of the PMs had been practicing their instruments for more than 10 years ($p < 0.001$) (Table 2).

In terms of the weekly hours of practice, we found that most of the PMs practiced more than 8 hours a week, whereas most of the EMs practiced less than 1 hour ($p < 0.001$). There were no significant differences between the number of hours of weekly practice and the presence of musical dreams, however 94% of those who practiced

more than 8 hours a week reported musical dreams, by contrast only 78.6% of those who practiced less than 1 hour per week dreamed with music (Table 1).

3.3.4 Frequency and phenomenology of musical dreams

A total of 27.4% of the study subjects who were not musicians reported never having dreams about music, while only 9.2% of the PMs have not. Most participants who reported dreaming about music said they did so once a week or once a month; non-musicians reported music dreams presence less frequently than PMs and EMs ($p < 0.001$) (Table 2).

Regarding the familiarity of the musical piece (Figure 3), 41.9% of the PMs reported dreams about unknown music, while only 7.5% of the non-musician participants reported this detail ($p < 0.001$). In addition, nonmusician participants reported dreams with known music and difficulty recalling the characteristics of the musical piece more frequently than musicians did. Most EMs dreamed of unmodified known music (31.8%), and approximately one in five experienced unfamiliar music during sleep (18.9%) (Table 2).

The PMs and EMs especially recognized instrumental and mixed music in their dreams, while those who were not musicians dreamed more of mixed music or could not remember what the sound was like. Dreaming of only voices was the least frequent response in the three groups (Table 2).

Regarding the speed of the musical piece, a high percentage of PMs could not remember the speed, and those who remembered it reported that it was equal to the speed of the original piece. Of the non-musicians, 12% reported a slower speed than the original piece, although not remembering this detail also prevailed. Those who reported a higher speed than the original were EMs (7.3%), although this option was the least reported option for all three groups (Table 2).

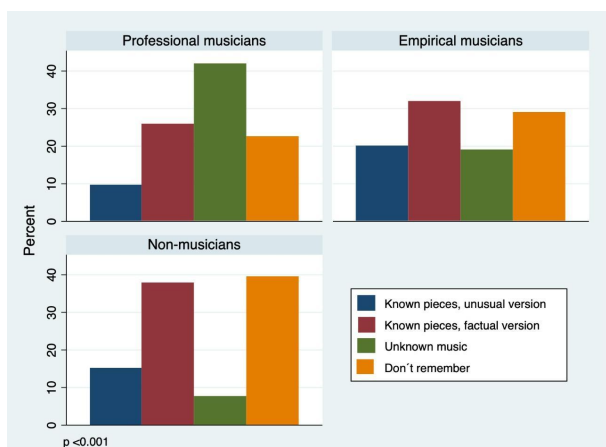


Figure 3. Familiarity of musical pieces in dreams among PMs, EMs and non-musicians

4. Discussion

To our knowledge, this is the first study to compare the prevalence and some phenomenological variables of musical dreams among PMs, EMs and non-musicians. Our research showed that the prevalence of musical dreams, particularly those referring to listening to music in dreams,

Table 2. Years of practice, type of instrument and phenomenological description of musical dreams among PMs, EMs and non-musicians.

Variable	Professional musicians (n= 97)	Empirical musicians (n=188)	Non-musicians (n=211)	p value
	n (%)	n (%)	n (%)	
Years playing the instrument				<0.001*
<5 years	2 (2.1)	50 (26.6)		
5–10 years	18 (18.7)	46 (23.9)		
>10 years	76 (79.1)	93 (49.4)		
Instrument				0.347*
Strings	60 (65.2)	125 (67.9)		
Percussion	25 (27.1)	40 (21.7)		
Winds	7 (7.6)	19 (10.3)		
Daily dedication				<0.001*
<1 hour	6 (6.1)	91 (49.1)		
1–3 hours	17 (17.5)	54 (29.1)		
3–5 hours	25 (25.7)	28 (14.1)		
5–8 hours	22 (22.6)	4 (2.1)		
>8 hours	27 (27.8)	8 (4.3)		
How often do you dream about music?				0.004
Never	9 (9.2)	32 (17.0)	58 (27.4)	
1 time/week	25 (25.7)	37 (19.6)	42 (19.9)	
1 time/year	9 (9.2)	22 (11.7)	20 (9.4)	
1 time/month	25 (25.7)	54 (28.7)	36 (17.1)	
1 time/semester	18 (18.5)	26 (13.8)	20 (9.4)	
1 time/life	3 (3.1)	4 (2.1)	10 (4.7)	
1 time/past 10 years	2 (2.1)	3 (1.6)	11 (5.2)	
1 time/past 5 years	6 (6.1)	10 (5.3)	14 (6.6)	
Familiarity of the musical piece				<0.001
Known/modified	9 (9.6)	36 (20.2)	28 (15.1)	
Known/not modified	24 (25.8)	56 (31.4)	70 (37.8)	
Unknown	39 (41.9)	34 (19.1)	14 (7.5)	
I don't remember	21 (22.5)	52 (29.2)	73 (39.4)	
Sound characteristics				0.001*
Instrumental	30 (32.2)	50 (28.1)	34 (18.4)	
Mixed	45 (48.3)	76 (42.7)	74 (40.2)	
Vocal	4 (4.3)	8 (4.4)	4 (2.1)	
I don't remember	14 (15.1)	44 (24.7)	72 (39.1)	
Musical piece speed				0.033*
Equal to original	28 (30.7)	68 (38.2)	49 (26.7)	
Slower	5 (5.4)	19 (10.6)	22 (12.0)	
Faster	3 (3.3)	13 (7.3)	7 (3.8)	
I don't remember	55 (60.4)	78 (43.8)	105 (57.3)	

Note: *Fisher's exact test p value

is higher among PMs (90.7%) compared to EMs (83%) and, to a lesser extent, non-musicians (72.5%). It is important to clarify that this prevalence answers the question of whether an individual has ever dreamed of music because, in contrast to other studies, the prevalences documented were much lower, ranging from 6% to 40%. This disagreement is probably because some of these studies have used dream diaries for short periods of time (14 to 30 days), calculated the percentage of musical dreams in relation to the total of remembered dreams, had smaller samples, where focused on psychology and/or politics students (Olbrich & Schredl,

2019) and our question asked about 'ever' having a music dream and does not refer to a specific period of time.

Additionally, our study showed that musicians who had been playing any instrument (strings, percussion or wind) for more than 5 years were more likely to dream of music, regardless of whether they were PMs or EMs. We were also able to establish the frequency of these dreams, finding that PMs, for the most part, dream of music once a week or once a month, EMs once a month and non-musicians even less often if ever. This indicates that those musicians who have spent more than 5 years practicing an instrument have probably generated a greater repertoire of musical memo-

ries and images that favor the processes of spontaneous musical evocation during sleep. However, we consider that in future research a statistical analysis should be carried out that includes a specific test to determine the relationship between the years playing the instrument and the frequency of musical dreams. It has been hypothesized that those who begin practicing an instrument in childhood and adolescence could have a higher percentage of musical dreams (Olbrich & Schredl, 2019). To shed more light on this hypothesis, it would be necessary to study the content of musical dreams in more detail, that is, whether the musical dream reflects current waking life or previous waking life experiences.

Some studies have associated more hours of practice with a greater presence of musical dreams, giving rise to the aforementioned continuity hypothesis of dreaming (Schredl, 2003). This hypothesis has been supported, for example, by the finding that sports students dream more about sports than psychology students (Erlacher & Schredl, 2004). Similarly, people who are involved in musical activities would be expected to dream of music more often. In our study, the number of hours per week of practice was not significantly different for PMs and EMs; however, it was evident that those who dreamed of music most often were those who practiced more than 8 hours per week. This finding has varied in studies, showing a relationship in some studies (e.g., König & Schredl, 2021b; Vogelsang et al., 2016) but not in others (e.g., Kern et al., 2014; Uga et al., 2006).

In relation to the familiarity of the sounds during dreams, the surprising finding was the high percentage of unknown or never heard music, which occurred mainly among the PMs and reached a prevalence of 41%. A similar study, which compared PMs versus non-musicians, documented a prevalence of unknown sounds during dreams of 28% for the former (Uga et al., 2006). In another study, one singer-songwriter reported that approximately 80% of his musical dreams included original music (Webb, 2016). It would be very interesting to study the dream content in composers versus non-composers to determine if there are differences.

The discovery of musical creativity during our subjects' dreams seems relevant to us, since there are anecdotes of artists with great compositions who report dreaming the melodies. While it is true that dreams are predominantly visual, research such as this shows that auditory imagery, such as musical memory, can be remembered from dreams. Music without modification was recalled mostly among non-musicians and modified versions occurred in 1 of 5 EMs of our sample. Novel music or random combinations of sounds during dreams are part of unconscious musical creativity, as evidenced mostly by PMs. The same has been documented in non-Western cultures, such as the case of the African singer Joseph Shabalala, who said it was natural for him to write novel music that he had heard in dreams (Barrett, 2001). There are also records that the shamans of Temiar Senoi of Malaya performed songs and rituals based on their dreams (Noone, 1939).

This same phenomenon of dream creativity has been seen in other areas of artistic expression, such as literature or painting. For example, Stephen King has stated in several interviews that some of his books have been inspired by dream images and narratives from childhood nightmares and night terrors (Ratna, 2020). Salvador Dalí painted his dreams with an extremely detailed and realistic technique, recording grotesque dream worlds that recalled the Freud-

ian unconscious and positioned him as one of the premier surrealists (Xu, 2021).

The limitations of this study include a potential memory bias, since the survey was retrospective. Asking participants to recount specific aspects about dream content may have led to errors or distortions. One study showed that demand characteristics represent a powerful factor in influencing the manifest dream. This effect is important because it can insidiously infiltrate research and act as a variable that affects dream content (Stern et al., 1978). In addition, retrospective estimates of the percentages of musical dreams may be biased by beliefs and expectations (Beaulieu-Prevost & Zadra, 2007) however, for sports subjects, the concordance between the frequency of sports dreams measured retrospectively and the frequency of sports dreams measured with dream diaries was very high (Erlacher & Schredl, 2004; Schredl & Erlacher, 2008) indicating that the retrospective measures have sufficient validity.

Another limitation of this study is that we did not include singers, dancers or DJs, and it was not clear whether someone who plays piano belongs to the percussion or strings group, so in future research these categories could be expanded. We also did not measure the number of hours a day of passive exposure to music, that is, music as the background while performing other activities. However, it is known that playing an instrument and listening to music actively have a greater relationship with the percentage of musical dreams compared to the amount of time spent listening to music passively (König et al., 2018). We also did not ask about the emotional tone evoked by the musical dream (which tends to be reported as positive) or the ability to solve problems the next day, as has been documented in other studies (Barrett, 2017). We did not explore whether the participants had lucid dreams and whether these dreams improved the performance of the instrument the next day, as suggested by a study with a very small sample ($n = 5$) (Schädlich & Erlacher, 2018). These aspects should be evaluated using other methodologies, such as dream diaries, direct interviews with the participants, application of validated sleep scales and physiological studies such as polysomnography, among others.

Finally, the definition of a music dream here (listening to musical fragments) differs from the one mentioned in the introduction, excluding talking about music, playing an instrument, and singing. This limits the scope of our results, and in future research, more specific questions should be asked to explore musical dreams according to their definition.

Taking into account our findings and the limitations of this study, we consider that the investigation of musical dreams is fertile ground, with much potential to discover the link between waking experiences and unconscious artistic creativity.

5. Conclusions

According to our results, the present study suggests that PMs have a higher prevalence of musical dreams than EMs and nonmusicians. In addition, they have a higher frequency of unknown sounds in dreams, which could be linked to unconscious creative processes. Musicians who have been practicing an instrument for more than 5 years are more likely to dream of music. This not only reinforces the notion that the content of dreams is related to waking activities and experiences but also that music in dreams could inspire musical compositions produced in waking hours, as

has been documented with visual dreams in literature writers and painters.

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