



The dancer personality: Comparing dancers and non-dancers in Germany and Sweden[☆]

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ABSTRACT

Data on the personality of dancers is sparse, and existing studies generally use small samples and heterogeneous measures of personality across studies. We investigated Big Five personality profiles of dancers in two large representative samples from Sweden ($n = 5435$) and Germany ($n = 574$). Musicians have previously been found to be more open, agreeable and neurotic than control participants who were not performing artists. We hypothesized that professional dancers would also be more open and more extraverted than non-dancers. Further, we explored the personalities of dancers of different dance styles. Results showed that the personality of dancers is indeed more open, extraverted, agreeable, but less neurotic, than people who do not dance, and dance school entrepreneurs, who are both dancers and entrepreneurs, even more so. Thus, dancers and musicians share high levels of openness, while neuroticism differentiates them. Furthermore, dancers and singers share high levels of extraversion, perhaps reflecting that, in dancing and singing, the performers' own body is the means of expression. Finally, some personality differences between dance styles were observed. Yet, these could be due to other factors than dance style choice; we discuss that these may reflect many factors, including musical genre preferences and social context.

1. Introduction

Dance expertise is becoming a recognized model for the empirical investigation of human neurocognitive functions. Research with dance and dance experts has been useful as a means to characterize the neurocognitive mechanisms of complex skill learning (Bläsing et al., 2012; Calvo-Merino et al., 2005; Calvo-Merino et al., 2006; Karpati et al., 2015), emotional competence (Bojner Horwitz et al., 2015; Christensen et al., 2016; Kirsch et al., 2016), healthy physical exercise (Christensen et al., 2021; Cross et al., 2013), and there is evidence to suggest that

dance practice is related to changes in brain and behaviour (e.g., Hänggi et al., 2010; Kirsch et al., 2016; Mitterová et al., 2021; Teixeira-Machado et al., 2019). An important question is to what extent any observed neurocognitive effects are a consequence of the engagement with dance, or, due to pre-existing personality differences between people that engage with dancing, as compared to people who do not dance.

Therefore, by means of two large representative samples (total $N = 6009$) from Sweden ($n = 5435$) and Germany ($n = 574$), we set out to investigate 'the dancer's personality'. Based on prior literature about musicians' and singers' personality (Kuckelkorn et al., 2021), we

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hypothesized that professional dancers are more open and extraverted than people who do not dance. We also expected to find personality differences in dancers of different dance styles, simply because dance styles differ along a number of characteristics that are likely to give rise to different preferences, which depend on personality. These differences include physical closeness to other dancers (e.g., solo, couple, and group dances), the level of motor skill required (e.g., varying levels of athletics, ranging from very high in ballet, to lower levels in some group dances), the neurocognitive complexity of the movement syllabus to be learned (e.g., 100+ movements and positions in ballet versus 5–10 basic steps in some group dances), and the type of music played (e.g., Western classical, Latin, rock, pop, swing, etc.).

1.1. Personality, creative professions and leisure activities

Personality traits have previously been found to be related to occupational and leisure choices (Feist, 1998, 1999; Götz & Götz, 1975; Holland, 1997; Kuper et al., 2022; Piepiora et al., 2022). For example, openness shows robust associations with creative activities and professions (de Manzano & Ullén, 2018; Feist, 1999; Kaufman, 2005; Woods & Hampson, 2010). Yet, ‘creative professions’ is a rather heterogeneous group of occupations that may well appeal differently to individuals with different personality traits (e.g., reviewed in Kaufmann, 2005). For example, personality differences have been observed between musicians of different levels of engagement (amateurs and professionals), and players of different instruments and singers (Kuckelkorn et al., 2021). A handful of studies have reported differences both between dancers and non-dancers, and between dancers of different styles. Yet, measures and results have been heterogeneous, and sample sizes, generally, very small.

Alter (1984) compared dance and arts students to non-artist groups, finding that dancers were less conformist, more impulsive and high on achievement and dominance as compared to visual arts students and controls. Marchant-Haycox and Wilson (1992) compared groups of dancers, actors, musicians and singers against a control group and normative values. They found that, compared to controls and norms, actors scored highest on extraversion and musicians scored lowest, while dancers scored highest on negative emotionality (though all groups of performing artists scored higher on negative emotionality, than controls). Another study found that professional ballet dancers were more conscientious than other professional dancers, and that both groups of professional dancers scored higher on openness to experience, than did controls (Budnik-Przybylska et al., 2019).

In the current investigation we extend the previous research by comparing the personality traits of professional dancers, amateurs and non-dancers (sample 1 and 2). In addition, in our German sample (sample 2), we were able to extend the comparison to dance school entrepreneurs, a special group of dance-related personnel, who is at the same time entrepreneur and dancer.

1.2. Personality and different dance styles

Kuckelkorn et al. (2021) found personality differences between amateur and professional musicians playing different instruments, and discussed that these may in part depend on differences in musical styles and social context of music making. Formalized dance styles vary along a series of important dimensions, and it appears possible that personality traits may influence whether individuals choose one dance style over another. Unsurprisingly, the first comparative studies suggest that personality profiles of dancers differ as a function of style. We note, however, that many of the studies we summarize below were again performed on relatively small sample sizes and heterogeneous measures of personality across studies.

Piepiora (2021) compared the personality profiles of 20 different athlete categories (including dancers; Koutedakis & Jamurtas, 2004), and found that break dancers had a significantly lower level of openness

to experience and agreeableness than ballroom dancers. Fink and Woschnjak (2011) compared modern/contemporary dancers, jazz/musical dancers and ballet dancers and found that modern/contemporary dancers had lower conscientiousness scores than jazz/musical dancers and ballet dancers, who did not differ between each other. Critically, these differences were not significant after adjustments for multiple comparisons. Barreiro and Furnham (2019) used a convenience sample of dancers and non-dancers and tested whether personality traits were associated with participation in seven dance styles (ballet, contemporary, jazz/tap, hip hop, Belly, standard and Latin). Conscientiousness was associated with greater likelihood in participating in ballet, jazz, contemporary and standard dance styles. Extraversion was associated with participation in Latin dance, which was also associated with higher openness. Belly dancing was associated with less neuroticism.

Here, we compare personality profiles of dancers of different dance styles (i.e., standard, Latin, ballet, street dance, swing dance, Argentine tango) in large cohorts, using a standard personality assessment.

1.3. Objectives

We utilize a large population-based sample ($n = 5435$) and a sample of dancers from Germany ($n = 574$) to compare Big Five personality profiles of dancers to non-dancers, and to specifically test the hypothesis that professional dancers are more open and extraverted than people who do not dance. Second, by means of a large-scale survey within the dance community in Germany, where dancers indicated their preferred dance style, we compared these groups’ Big Five personality profiles with each other and with a large normative sample. We expected differences between styles, given that dance styles differ in a number of characteristics that likely tap into differences in preferences as a function of personality (e.g., closeness, complexity, and music). Participants indicated their main dance style, either by clicking on a dance style in a list or, by writing it in a box, if their dance style was not indicated in the list. The largest number of self-reported mentions was for the dance styles standard, Latin, ballet, street dance, swing dance, and Argentine tango. We grouped the self-reported mentions of dance styles into these six overarching categories of dance styles and will refer to these six as “dance styles” in what follows, even though each category includes several dance styles in itself.

2. Methods

The Regional Ethics Review Board in [Stockholm] (Dnr 2011/570-31/5. 2012/1107-32, 2018/866-32) approved the Swedish data collection. For the data collection of the German sample all experimental procedures were ethically approved by the Ethics Council of the [Max Planck Society] (Nr. 2017_12). In both studies, national guidelines and regulations were followed in accordance with the Helsinki Declaration for Experimentation with Human Subjects (WHO, 2001). Informed consent was given before participation (via a click button system on the online platform of the surveys).

2.1. Participants (Swedish sample)

The Swedish data is part of data collected within a large-scale population-based cohort, “The Study of Twin Adults: Genes and Environment” (STAGE) of about 32,000 adult twins registered with the Swedish Twin Registry (STR). In 2012–13, a web-based survey was sent out to collect data on, among other things, participants’ creative engagement, including dance achievement. Of the responders, dance achievement data were available for 5435 participants in the Swedish sample (2289 males, 41.1 %), aged between 27 and 54 years ($M = 41.02$; $SD = 7.81$).

2.2. Participants (German sample)

A total of 574 participants (188 male, 383 female, one transgender, one diverse, one non-binary) filled in the questionnaire (age range: 18–83 years). Participants had an average of 15.83 years of dance experience ($SD = 12.52$, range: 0–59). From the original sample, one participant was excluded due to unrealistic answers. The experiment took approximately 50 min and participants who were interested submitted their contact details for a lottery (winning a ticket for a dance festival, a dance book or vouchers for dance shops).

Data was collected online through the software tool Unipark® in the period February 2020 to June 2021. The survey was advertised widely in Germany, through several large dance organizations' social media networks. Most of the data collection unfortunately fell into the time of the Covid-19 pandemic making a broader in-person advertisement of the survey in several national dance schools, as initially planned, difficult.

Participants first completed a demographics questionnaire and a dance demographics questionnaire, where they indicated which dance styles they practice regularly. For their three most important styles they responded to a more detailed questionnaire including the years of experience, hours training per week, etc. The BFI-II-S in German was the eighth questionnaire.

2.3. Measures and procedure

2.3.1. Big Five Inventory (BFI)

2.3.1.1. Swedish sample. The 44-item Big Five Inventory (BFI-44) was used to measure personality (Zakrisson, 2010). The questionnaire consists of 44 items, with items assessing each of the Big Five dimensions. The items were answered on a 5-point rating scale from *disagree strongly* to *agree strongly*. This Swedish translation and validation of the classical instrument showed good reliability and validity (Cronbach's alpha 0.73 to 0.84).

2.3.1.2. German sample. The German version of the Big Five Inventory-II short form (BFI-II-S) was used to assess personality (Rammstedt et al., 2018; Soto & John, 2017a, 2017b). The questionnaire consists of thirty items, with six items assessing each of the Big Five domains. The items were answered on a 5-point rating scale from *disagree strongly* to *agree strongly*. The Cronbach's alphas for the scales ranged from 0.69 to 0.81, suggesting adequate reliability.

2.3.2. Dance demographics assessment

2.3.2.1. Swedish sample (dance achievement). Participants' dance achievement was assessed via the Swedish version of the Creative Achievements Questionnaire (CAQ; Carson et al., 2005) which measures creative achievement in seven domains, one of which is dance. Participants rated their engagement with dance on a seven-point scale.

We grouped these levels of dance achievement into three for our analyses:

- (1) People who do not dance at all served as the normative sample against which we compared the dancers (i.e., individuals who score "1" on the CAQ-dance: 1– 'I am not engaged in dance at all').
- (2) Amateur dancers who practice dance, but never perform (i.e., individuals who scored between "2" and "3" on the CAQ-dance: 2– 'I have taught myself to dance and I dance privately, but have never performed for anyone', and 3– 'I have taken formal dance classes, but have never performed for anyone').
- (3) Performing dancers who both practice and perform dance (i.e., individuals who scored between "4" and "7" on the CAQ-dance: 4– 'I have taken part in local dance performances in my hometown but not been paid for it', 5– 'I have taken part in local dance

performances in my hometown and been paid for it', 6– 'I'm dancing professionally', and 7– 'I am a professional dancer and my dancing has been reviewed in the national or international press and/or I have won at least one prize for my dancing').

The division between (2) and (3) was based on literature that shows a close link between stress and performance in dance professions (Berndt et al., 2012; de Manzano & Ullén, 2021; Edmonds et al., 2018; Quested et al., 2011; Rohleder et al., 2007). Also, broader literature on social evaluative stress when performing suggests that even in the amateur dance realm (Labuschagne et al., 2019; Mansfield et al., 2018; Zijlmans et al., 2013), performing on stage should be considered a separate class of activity.

2.3.2.2. German sample (dance engagement and dance style). Dance engagement questions were based on those proposed in Alter (1997) and Lakes et al. (2016). Participants were asked to indicate their level of engagement with dance: *amateur dancer* (I only dance for fun), *amateur dancer* (and I take part in competitions), *professional dancer* (I do shows, competitions), *dance teacher* (I dance as a side-job), *dance teacher* (I dance as main job), *dance school owner* (i.e., I own or manage a dance school), *other dance school personnel* (I'm other personnel in a dance school).

Participants were then asked to indicate their main dance style. Participants indicated a total of 53 different dance styles in the questionnaire as their "main" style. These were grouped into six categories of dance styles by two professional dancers following the common overarching categories for these styles: standard, Latin, ballet, street dance, swing dance, Argentine tango. This resulted in a number of dance styles with less than 5 mentions to be excluded. See Table 1 for this grouping.

2.4. Data analyses

In this study, we investigated two research questions: (1) Are dancers more open and extraverted? (Swedish and German sample). And (2) Are there personality differences between dancers of different styles? (German sample only).

For the analyses of both research questions, we used SPSS v. 28 to conduct Multivariate analyses of Covariance (MANCOVA) with the Big Five personality traits as dependent variables (extraversion, conscientiousness, agreeableness, openness, neuroticism). Between-groups factors were, for research question 1, the engagement groups (amateur, professional, dance school entrepreneur) or, for research question 2, the different dance categories (i.e., the dance styles that were grouped into the categories standard, Latin, Argentine tango, swing dance, ballet, street dance). In both analyses, we controlled for age and gender. All significance tests were two-tailed and post-hoc comparisons were all Sidak adjusted.

3. Results

3.1. RQ 1: are dancers more open and extraverted?

3.1.1. Results Swedish sample

A MANCOVA with the Big Five personality traits as dependent variables and engagement group as between-group factor (controlling for age and gender) showed a significant main effect of engagement group (non-dancer, amateur, performing) on personality traits (Pillai's trace, $V = 0.043$, $F(10, 10,854) = 23.611$, $p < .001$). Significant between-subjects effects suggested differences between the groups for openness ($p < .001$), extraversion ($p < .001$), and for agreeableness ($p < .001$).

Sidak adjusted post-hoc comparisons revealed that, as predicted, for openness, non-dancers scored lower than amateurs ($p < .001$), and performing dancers ($p < .001$). Furthermore, performing dancers scored higher than amateur dancers ($p = .038$). For extraversion, non-dancers

Table 1
Dance styles categorization for analysis, based on participants' selected main dance style.

	Dance category	Dance style
1	Standard/ballroom*	<i>Standard Dances</i> <i>Latin</i> Discofox Slowfox Jive
2	Latin American dances	Kizomba Salsa Bachata Zouk Canyengue Forro Hustle
3	Argentine tango	Argentine tango
4	Swing dance	Swing Dances Boogie Woogie Lindy Hop Rock'n'Roll
5	Ballet	Ballet
6	Street dance	Hip hop & other Street Dance Styles Gare Shuffle

Note. Dance style categorization for German sample as a function of self-chosen main dance style. These six main categories of dances (left column: standard, Latin, Argentine tango, swing, ballet, swing dance) exclude a number of dance styles that only 1–2 people indicated as their main style and that did not fall into these main categories. *“Standard” and “ballroom” refer to a group of dances that are usually practiced together as part of a course or competition. As this study was conducted in Europe, we use the term “Standard” and the included dance styles are slow valse, Viennese valse, tango, foxtrot/quickstep, and slow fox. The term “ballroom” is mostly used in the US and includes a similar set of dance styles. For the grouping of dance styles in the right column please note that “Standard” refers to the group of dances outlined above, while “Latin” is also a term used to group a series of dances, including rumba, cha cha cha, jive, samba and paso doble. We have therefore set these labels in italics. Participants who indicated “Standard” or “Latin” hence are practitioners of these series of styles. Besides, any participant who indicated either of these dances (that pertain to the group of standard of Latin dances) as their main style, was also classified within this dance category. We created the dance category of Latin American dances (left column) to group any dance styles from Latin America. Finally, please note that “Tango” and “Argentine Tango” are two very different dance styles, which is why we have categorized them in separate categories.

again scored lower than both amateurs ($p < .001$) and performing dancers ($p < .001$), though no differences between amateurs and performing dancers were observed ($p = 1$). For agreeableness, non-dancers scored lower than amateurs ($p = .003$) and performing dancers ($p = .028$), while there was no difference between amateurs and performing dancers ($p = .951$). All other comparisons were non-significant. These results are shown in Fig. 1A.

3.1.2. Results German sample

A MANCOVA with the Big Five personality traits as dependent variables and engagement group as between-group factor (controlling for age and gender) was conducted to investigate differences between the three levels of engagement (amateur, professional, dance school entrepreneur). There was a significant overall effect of engagement group on personality ($F(10, 1112) = 6.40, p < .001$). Sidak adjusted post-hoc comparisons revealed that, on openness, amateur dancers scored lower than dance school entrepreneurs ($p = .001$) and professionals ($p = .01$). Dance school entrepreneurs were more extraverted than professionals ($p = .04$) and amateur dancers ($p < .001$), and professionals were also more extraverted than amateurs ($p = .003$). Amateur dancers were less agreeable than dance school entrepreneurs ($p < .001$) and professionals ($p = .01$). No other comparisons were significant (Fig. 1B).

Differences between the three engagement groups and norms from the original scale validation paper were tested with independent

samples Welch's t -tests. Sidak adjusted differences (number of tests = 15) between dancers at all levels of engagement and norms were observed for openness, extraversion and neuroticism. As compared to norms, all engagement groups were more open and extraverted but less neurotic. Professionals and dance school entrepreneurs scored higher than the norm on agreeableness. No other significant differences were observed (see Table 2).

3.2. RQ 2: are there personality differences between dancers of different styles?

A MANCOVA with the Big Five personality traits as dependent variables and dance category as between-group factor (controlling for age and gender) was conducted to investigate personality differences between dancers of different categories (i.e., the dance styles were grouped into the categories standard, Latin, Argentine tango, swing dance, ballet, and street dance). A significant overall effect of dance category was found ($F(25, 2395) = 2.88, p < .001$). Subsequent Sidak adjusted post-hoc pairwise comparisons revealed group differences in openness and neuroticism. For openness, Argentine tango dancers scored higher than standard ($p = .02$) and Latin ($p = .005$) dancers, ballet dancers were more open than Latin ($p < .001$), standard ($p = .002$), and street ($p = .008$) dancers. For neuroticism, swing dancers scored lower than standard ($p = .003$), Latin ($p = .049$), and Argentine tango ($p = .04$) dancers. All other comparisons were non-significant. See Fig. 2 for an illustration of results.

Independent samples Welch's t -tests were used to determine personality differences between dancers of different categories and norms. Sidak adjusted differences (number of tests = 30) between categories differed from the norms in all personality traits except from conscientiousness. For openness, dancers of all categories, apart from street dance, were more open than norms. For extraversion, dancers of all categories scored higher than the norms. For agreeableness, ballet and Latin dancers scored higher than norms. Finally, for neuroticism, swing dancers had the largest deviation from the norms, showing the lowest levels of neuroticism, followed by Argentine tango and Latin dancers. See Fig. 2 and Table 3.

4. Discussion

Our results from two large-scale studies showed that the dancer personality is, generally, more open to experience, more extraverted, more agreeable, and less neurotic than non-dancers and norms. Dance school entrepreneurs, a special group of people that are both entrepreneurs and dancers, were generally even more open and agreeable and less neurotic than dancers and non-dancers.

From other domains of creative practice, we know that amateur artists and professional artists differ psychologically in a variety of ways as evidenced by previous research (Alter, 1984; Budnik-Przybylska et al., 2019; Marchant-Haycox & Wilson, 1992). Previously, amateur musicians have been found to be more open, extraverted, agreeable and neurotic than non-musicians (Kuckelkorn et al., 2021). We found that while amateur dancers were also more open, extraverted, and agreeable, they were not more neurotic. Similarly, professional musicians have previously been found to be more open and more neurotic than non-musicians (Kuckelkorn et al., 2021). In our sample, professional dancers, while also more open than non-dancers, they were also more extraverted and agreeable, but less neurotic. The fact that dancers were less neurotic than non-dancers and norms, while musicians have been found to be more neurotic than non-musicians, suggests that neuroticism is perhaps a personality trait that differentiates dancers and musicians, while both have similar personality profiles in terms of openness (and, for amateurs, also in agreeableness and extraversion). Perhaps the personality trait of neuroticism is more limiting in theatrical arts like dance and singing than for instrumental musical performances. Notably, in the case of music-making, much attention is focused on the sounding result

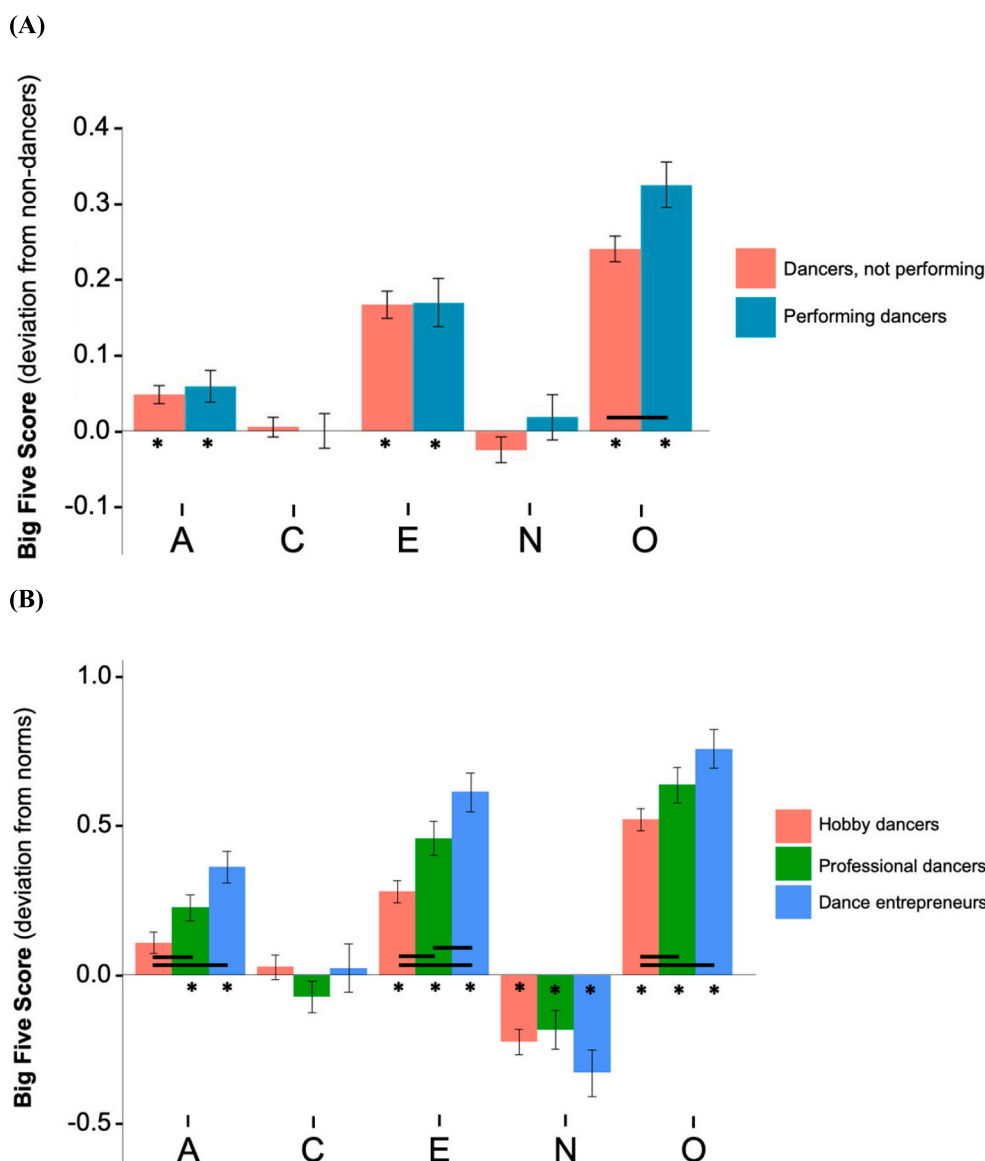


Fig. 1. BFI personality traits of dance engagement groups (Swedish and German data).

Note: (A) Swedish data. Estimated marginal means of Big Five (BFI-44) personality traits (Sidak adjusted post-hoc pairwise comparisons, controlling for age and gender), compared to non-dancers of the same sample (0 on the y-axis), and as a function of dance engagement group (controls, amateur, performing). Whiskers are error bars, *asterisks indicate significant differences from the non-dancers (0 on the y-axis). (B) German data. Estimated marginal means of Big Five (BFI-5) personality traits (Sidak adjusted post-hoc pairwise comparisons, controlling for age and gender), compared to norms from the original scale validation paper (0 on the y-axis), and as a function of dance engagement group (controls, amateur, performing). Whiskers are error bars, *asterisks indicate significant differences from the norms (0-axis). Black lines on both graphs indicate significant Sidak adjusted group differences. A = Agreeableness; C = Conscientiousness; E = Extraversion; N = Neuroticism; O = Openness to Experience.

of the performance, rather than the body of the performer. In dancing and singing, in contrast, the dancer's and singer's body are the sole means of artistic expression and therefore a constant focus of attention for both performer and spectator. Our results regarding dancers' extraversion are similar to those previously found for singers, and it could be speculated that extraversion plays a role in the choice of performative art when the expressivity involves the body directly (dancing or singing as a way of expression), or indirectly (via an instrument).

The high levels of agreeableness that we find within the dancer sample merits further scrutiny, as it is a personality trait that may make the person malleable to negative external influences if combined with emotional instability (Lee & Song, 2017). However, trait agreeableness has also been described as a protective factor against negative emotionality, a precursor of neuroticism (Ode & Robinson, 2007). Hence, the combination of high levels of agreeableness and low levels of

neuroticism in the dancer sample may in fact be what protects dancers from negative affect. Some research has shown that specifically neuroticism is a risk factor for such negative perfectionism (Goodwin et al., 2014; Neumärker et al., 2000; Penniment & Egan, 2012; Silverii et al., 2021; Thomas et al., 2005) for the individual (Nordin-Bates & Jowett, 2021; Scoffier-Mériaux et al., 2015).

Several studies have discussed the high levels of conscientiousness and perfectionism found in ballet dancers (Goodwin et al., 2014; Neumärker et al., 2000; Penniment & Egan, 2012; Silverii et al., 2021; Thomas et al., 2005), and their possible relationship to eating disorders, other body-image related disorders and propensity to physical injury in both recreational and professional dance students (Garrick & Lewis, 2001; Goertzen et al., 1989; Goodwin et al., 2014; Hamilton et al., 1989; Zolčić & Duraković-Belko, 2009). We could not replicate such previous effects with regards to conscientiousness (the closest personality trait to

Table 2
Differences between dance engagement groups and norms (German data).

Variable		E	A	C	N	O
Amateur dancers	<i>t</i>	6.48	2.33	1.02	4.93	11.76
	<i>p</i>	<i>p</i> < .001	<i>p</i> < .001	<i>p</i> < .001	<i>p</i> < .001	<i>p</i> < .001
	<i>ES</i>	0.40	0.15	0.07	0.30	0.71
Professional dancers	<i>t</i>	7.61	5.63	1.57	3.13	11.41
	<i>p</i>	<i>p</i> < .001	<i>p</i> < .001	<i>p</i> < .001	<i>p</i> < .001	<i>p</i> < .001
	<i>ES</i>	0.65	0.43	0.13	0.26	0.94
Dance school entrepreneurs	<i>t</i>	10.43	6.63	0.21	4.52	12.62
	<i>p</i>	<i>p</i> < .001	<i>p</i> < .001	<i>p</i> < .001	<i>p</i> < .001	<i>p</i> < .001
	<i>ES</i>	1.00	0.63	0.025	0.45	1.11

Note: German data. Results from Welch's *t*-tests for differences between engagement groups and norms. For openness, all dance engagement groups scored higher than norms, with dance school entrepreneurs and professionals having large-sized differences, while the difference with amateur dancers was medium. For extraversion, all engagement groups scored higher than norms, with dance school entrepreneurs having a large effect size difference, while for the other two groups, effect sizes were medium. For agreeableness, dance school entrepreneurs and professionals were significantly higher than norms with a medium effect size. For neuroticism, all groups scored significantly lower than norms, with owners having a medium-sized difference, and the other groups a small effect size difference. ES = effect size (Cohen's *d*).

the 'perfectionism' variable from previous studies) (Barreiro & Furnham, 2019; Fink & Woschnjak, 2011) in either of the two samples.

We found some personality differences between the different dance categories (i.e., the dance styles grouped into the six categories of dance style: standard, Latin, Argentine tango, swing dance, ballet, street dance; cf. Table 1): Ballet dancers and Argentine tango dancers were more open than dancers of some of the other dance styles, including dancers of standard and Latin. Street dancers were generally less open than ballet dancers. There may be elements in ballet and Argentine tango practice which may explain that individuals who are open to experience enjoy the former dance styles more than Standard or Latin dance. One explanation could be that ballet and Argentine tango dancers have high levels of openness to experience because it helps them adapt easily to the daily training regimes which comprise ever new combinations of the classical movement vocabulary, and often learning with a number of

different rehearsal directors and choreographers – much like classical musicians learn to play ever new pieces during their training and must adapt and be open to different teachers and conductors. Previous research has evidenced a robust association between the personality trait openness to experience and creativity (Hornberg & Reiter-Palmon, 2017). Yet, this would not explain why street dancers are also less open than ballet dancers, since street dancing is also a highly creative artform. We also did not replicate previous findings that Latin dancers are be more extraverted or open than dancers of other styles (Barreiro & Furnham, 2019); rather we found them to be less open than ballet dancers and Argentine tango dancers. Piepiora (2021) found that performers of break dance (a type of street dance) were less open and agreeable than standard dancers, while our sample of street dancers did not differ from the other dance styles in terms of agreeableness, and in fact, scored lower in openness than ballet dancers.

The swing dance practitioners, generally, were less neurotic than dancers of Argentine tango, Latin and standard. We speculate that these differences could be due to swing dance being a very upbeat dance style which people scoring high in neuroticism may not bond with easily. Lolich et al. (2015) investigated affective temperaments in a sample of Argentine tango dancers and found that, compared to non-dancers, the dancers showed higher emotionality and irritability. The authors interpreted this as mirroring the characteristics of Argentine tango dance practice that is rather melancholic (Lolich et al., 2015). Yet, it should be remembered that all dancer groups in our study scored significantly lower on neuroticism than non-dancers. From the music domain, it has been discussed that there are significant differences in personality profiles between musicians of different instrument categories (wind, bowed, plucked, keyboard, percussion, etc.) (Kuckelkorn et al., 2021). Yet, the patterns were inconsistent across amateurs and professionals and the authors speculated that differences could also have been due to musical genre and the social context of the music making that may appeal more to certain personalities and not others. Similarly, in the data from dancers, these characteristics surrounding the dance practice could also explain the differences we found for dancers of different dance categories.

As mentioned in the introduction, previous research in the domain of the dancers' personality has suffered from a series of pitfalls, due to small sample sizes and sometimes uncommon measures of personality. It is thus not surprising that our large scale studies showed somewhat

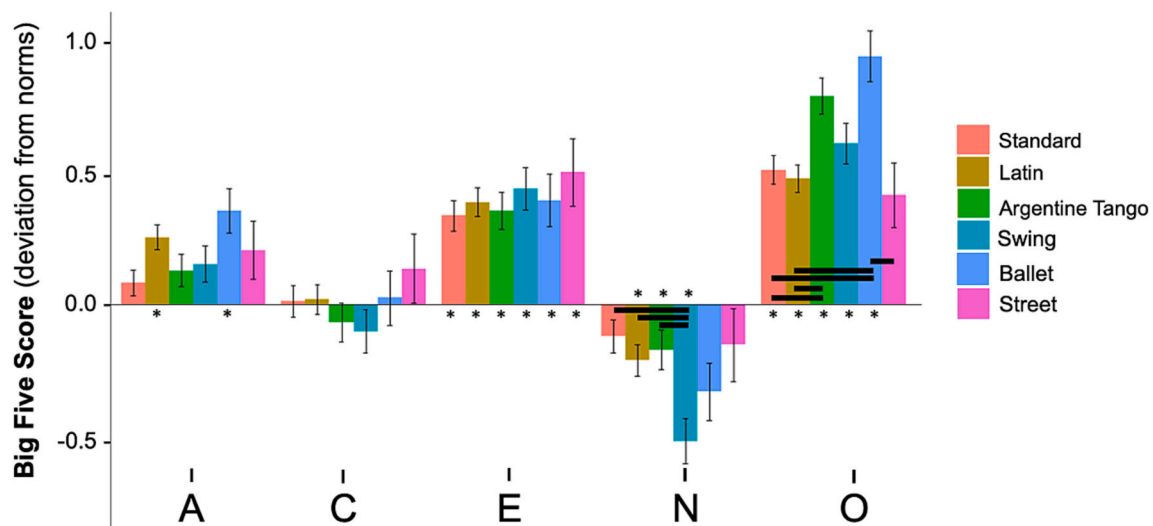


Fig. 2. Personality trait (BFI-S) differences between different dance categories and norms in the German data.

Note: Estimated marginal means of Big Five personality traits (Sidak adjusted post-hoc pairwise comparisons, controlling for age and gender), compared to norms (0 on the y-axis) and as a function of dance categories (i.e., the dance styles were grouped into the categories standard, Latin, Argentine tango, swing dance, ballet, street dance). Whiskers are error bars. Black lines indicate significant Sidak adjusted group differences and *asterisks indicate significant differences from the norms (0-axis). A = Agreeableness; C = Conscientiousness; E = Extraversion; N = Neuroticism; O = Openness to Experience.

Table 3
Personality traits (BFI-S) between different dance styles and norms (German data).

Variable	Extroversion			Agreeableness			Conscientiousness			Neuroticism			Openness to Experience		
	t	p	ES	t	p	ES	t	p	ES	t	p	ES	t	p	ES
Standard	5.75	p < .001	0.53	1.48	p < .001	0.13	0.17	p < .001	0.02	2.95	p < .001	0.26	8.55	p < .001	0.75
Latin	6.72	p < .001	0.58	5.09	p < .001	0.44	0.13	p < .001	0.01	3.73	p < .001	0.33	9.21	p < .001	0.70
Argentine Tango	5.67	p < .001	0.61	1.92	p < .001	0.22	0.44	p < .001	0.06	3.77	p < .001	0.41	11.59	p < .001	1.17
Swing	4.80	p < .001	0.65	2.19	p < .001	0.27	1.29	p < .001	0.18	5.79	p < .001	0.72	8.02	p < .001	0.88
Ballet	4.04	p < .001	0.59	5.91	p < .001	0.68	0.50	p < .001	0.08	1.98	p < .001	0.29	9.77	p < .001	1.28
Street	3.73	p < .001	0.66	2.48	p < .001	0.42	0.97	p < .001	0.17	0.65	p < .001	0.12	2.47	p < .001	0.48

Note: German data. Sidak adjusted differences tests (number of tests = 30) of the five personality traits between dancers of different dance categories and norms. For openness, dancers of all categories, apart from street dance, were more open than norms, with large effect sizes observed for the differences. For extroversion, dancers of all categories scored higher than the norms with medium effect sizes. For agreeableness, ballet and Latin dancers scored significantly higher than norms, with medium effect sizes. For neuroticism, swing dancers had the largest deviation from the norms (medium-large effect size), followed by Argentine tango and Latin dancers (small-medium effect sizes). ES = effect size (Cohen's d).

different results. Despite subtle methodological differences between our two assessments (e.g., the classification of the engagement variables, personality questionnaire used; BFI-44 vs. BFI-S), the results from our two samples converge and replicate well, even if the Swedish sample was a population-based sample and much larger which included both dancers and non-dancers, while the German sample was collected only within a dance community, and as normative values, we used the data from the source publication. Thus, the results of the two studies provide a first reliable insight to the dancer's personality. Future assessments of dancers' personality would ideally include also dancers from non-Western countries and dance styles. For our study we relied on Swedish and German dancers and mostly on Western dance styles, given that our samples were based on large-scale studies performed in the countries where we have our main research activity.

5. Conclusion

Our findings about personality predispositions of dance practitioners, based on two powered studies, suggest that professional dancers and dance school entrepreneurs are likely to have a personality profile characterized by high extraversion, openness, and agreeableness and low neuroticism.

This personality profile has previously also been reported for musicians and singers, although neuroticism was found to differentiate practitioners of these two artforms (Kuckelkorn et al., 2021). Further, dancers and singers share high levels of extraversion, possibly explained by the bodily mode of expression in dancing and singing, where the expressivity comes directly from the performers' body instead of indirectly via an instrument. With regards to personality differences as a function of dance style, we speculate that these could be due to other factors than dance style choice, including musical genre or the distinct social communities. The present results complement earlier work on the personality profiles of different types of musicians, and underscore that group differences between dancers and non-dancers in various outcomes cannot be assumed only to be the consequence of dance practice, but may also reflect differences in predisposition. In general, these results are in line with a multi-factorial view of expertise, according to which high level performance depends not only on long-term practice but also on various psychological and physical traits of the individual, which facilitate optimal performance on tasks that are relevant for a particular domain of expertise (for reviews see e.g., Epstein, 2013; Ullén et al. 2016).

CRedit authorship contribution statement

Julia F. Christensen: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Laura W. Wesseldijk:** Data curation, Formal analysis, Methodology, Validation, Visualization,

Writing – review & editing. **Miriam A. Mosing:** Conceptualization, Methodology, Project administration, Resources, Supervision, Validation, Writing – review & editing. **Kirill Fayn:** Conceptualization, Data curation, Formal analysis, Methodology, Software, Validation, Visualization, Writing – review & editing. **Eva-Madeleine Schmidt:** Data curation, Methodology, Validation, Visualization, Writing – review & editing. **Matthias Blattmann:** Conceptualization, Funding acquisition, Resources, Writing – review & editing. **Luisa Sancho-Escanero:** Conceptualization, Investigation, Methodology, Project administration, Resources, Writing – review & editing. **Fredrik Ullén:** Conceptualization, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing – review & editing.

Declaration of competing interest

None.

Data availability

The authors do not have permission to share data.

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