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The Influence of Formats and Preferences on the Aesthetic Experience of Classical Music Concert Streams

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Music is listened to in many different situational and media frames that can be expected to shape its experience. In this study, we were interested in the effects that different formats of audiovisual streaming of classical concerts can have on the aesthetic experience of their audience. We also investigated the effects of preferences for streaming features. A total of $N = 525$ participants watched one of four chamber music concert streams and reported their expectations, appreciation, and experiences. Overall, participants liked the concerts and reported positive experiences. The immersive emotional and social dimensions of aesthetic experiences with music, however, were only rarely activated, showing the disadvantage of recorded as compared to live performances. Several experience dimensions were influenced by streaming format: a stream that allowed audience members to interact on a chat platform afforded a stronger social experience, but less concentration; while a stream that included an introductory talk led to a better understanding of the programming and increased feelings of melancholy. Effects of the preference for certain stream types were only found in the stream that most resembled a standard audiovisual concert broadcast but were leveled out in other stream formats explicitly designed to counterbalance known disadvantages of nonlive performances. From our study, we draw conclusions regarding the importance of an experimental approach to frame effects not only on the aesthetic experience of music but also on the future of concert streams as a new musical medium in its own (aesthetic) right.

Keywords: liveness, aesthetic experience, music streaming, classical concert

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A concert is, by definition, a live performance of music characterized by the physical co-presence of musician(s) and audience such that music production and reception occur simultaneously (Auslander, 1999/2008). But concerts also exist in mediatized forms. In addition to established audio and audiovisual broadcast formats, audiovisual concert streaming on the internet has become widespread and popular during the COVID-19 pandemic (Frank, 2020; Grant, 2020; Khalid, 2020; Rendell, 2021; Vandenberg et al., 2021; Weaver et al., 2020). A relatively new medium, digital concert streaming has not yet been subject to technical and artistic standardization (Setzke et al, 2018; van de Werff et al., 2021) and can take a great variety of forms—consisting either of old or new recorded performances, the latter presented either live or on demand. Performances can be staged in a typical concert setting or, as a result of lockdown measures, from the musicians' own studios or homes; in the latter case, spoken comments of the musicians have become a common substitute of the direct contact between musicians and their audience in a live setting; and they can be circulated on a range of streaming and social media platforms, with various possibilities for audience interaction. Although the discussion about streaming among journalists, musicians, and audiences has focused mainly on the extent to which streams can approximate the live experience (Aguilar, 2014; Bakhshi & Throsby, 2014; Furu & Reckhenrich, 2021; Mueser & Vlachos, 2018), other questions also arise. One of these is what effect different forms and features of concert streaming can have on the aesthetic experience of the music being performed; and this question is relevant for the further artistic development of concert streaming, not merely as a surrogate for live concerts, but also as an independent musical medium in its own right, one that may continue to be of aesthetic interest after the pandemic as well.

This paper is part of a research project on the effects that different types of streams of classical music concerts can have on their audience (*name of project masked for review*). At its core lies the idea that the concert or any other musical medium acts as a frame that influences the aesthetic experience of the music being performed and that to study such frame effects we need to manipulate them experimentally (Seibert et al., 2020; Wald-Fuhrmann et al., 2021). As a first step, we asked audiences of classical music about their preferences regarding a number of possible features of concert streams and found three distinct preference groups (*ref. masked for*

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review): *Enthusiasts*, who demonstrated interest in streams with all kinds of features; *Purists*, who preferred streams that resembled standard concerts in terms of duration and setting but disliked the idea of virtually interacting with other audience members or the musicians, as well as the use of immersive media; and a *Less engaged* group, who reported a generally lower interest in concert streams and were interested mainly in short on-demand concerts with additional information. The present study extends these findings on the basis of an experiment in which a sub-sample of participants of the first study viewed one of four versions of an audiovisual stream of the same chamber music concert in their homes and reported on several aspects of their aesthetic experiences.

In music, media, and performance studies, there is a large body of historical, theoretical, and market- and consumer-oriented research on musical live performances and the various mediatized forms of music distribution (Auslander, 1999/2008; Baade & Deaville, 2016; Fischer-Lichte, 2004/2008; Fritsch & Strötgen, 2012; Negus, 2006; Phelan, 1993; Pitts, 2005; Tröndle, 2011, 2020). Recently, digital forms of music distribution and reception have also sparked interest among scholars (Harvey, 2014; Nowak, 2016; Trippett, 2014), not only in and of themselves but also in comparison to live events (Holt, 2010; King, 2018; Mueser & Vlachos, 2018). Empirical research on music frames and media, however, is still relatively scarce. The largest body of such research can be found in qualitative and questionnaire studies on concert audiences' motivations and experiences (Ballantyne et al., 2014; Brown & Knox, 2017; Burland & Pitts, 2014; Charron, 2017; Dearn & Price, 2016; Kjus & Danielsen, 2014).

Still in their infancy, empirical and experimental studies have begun to explore the concrete effects of formats and media on audiences' music experience. Bennett (2014) and Nguyen (2018) have found positive effects of social media communication during both live concerts and livestreams on feelings of social connectedness among audience members. In several comparisons between live and recorded performances, researchers found an advantage for live performances on both physical (Swarbrick et al., 2019) and physiological (Shoda et al., 2016) entrainment of audience members with the music but also on appreciation and social connectedness (Shoda & Adachi, 2012, 2015). Regarding concert streams, a livestream was shown to afford stronger feelings of social connection, but not of being moved, as compared with a prerecorded stream (Swarbrick et al., 2021). In an experiment involving three livestreams with different musical programs and properties, Onderdijk et al. (2021) examined the roles of agency, of the feeling of physical presence, and of social context for feeling connected with the musicians and other audience members. Watching a livestream via a VR headset increased the feeling of physical presence, spatial presence, and involvement as compared with viewing a 2D screen version. In turn, watching a stream with others via Zoom and being able to see one another and communicate via the chat feature increased the feeling of social (but not physical) presence. A direct relationship between stream properties and the experiences they were supposed to evoke and feelings of social connection, however, was only found very rarely. This was partly due to the fact that some of the manipulations, for example, those intended to evoke agency, were not successful. Also, the number of participants in each condition was very small (between 6 and 16).

Other concert stream experiments using 360° videos, VR environments, and 3D audio were able to show that 3D audio enhanced the experience of presence, which in turn positively influenced parasocial interaction and enjoyment (Shin et al., 2019) and that the presence of virtual avatars that moved with the music in a 3D rendition of a concert led to a better social experience (Yakura & Goto, 2020). This was linked to observations made in an online ethnography of a concert on Second Life that similarly found that a virtual environment was able to afford intense music and social experiences (Harvey, 2014).

In sum, there is some initial empirical evidence that the social and intense music experiences that concerts reliably afford, and that are central to the experience of liveness, can also partially be evoked by live and pre-recorded streams if they come with additional features explicitly targeting these experiential dimensions. Features that invite feelings of presence and social connection seem to be particularly relevant in this context.

With our study, we aimed to contribute to this emerging body of research with a more controlled experiment that examines effects of concert stream features on audiences' appreciation and experiences of the same performance of the same pieces of music. To do so, we created four different streams that differed regarding access (on-demand vs. fixed-date), temporal co-presence of others, social interaction possibility, and additional information on the musical pieces. (A VR condition based on a 360° video recording was also part of the experiment but will be dealt with in a separate publication.) In some aspects, this set of conditions was connected with the already existing studies, that is, concerning the role of temporal co-presence and virtual possibilities to interact with each other. Other aspects have not yet been studied empirically but were instead inspired by prominent differences among the variety of concert streams, that is, the role of duration, access options, and additional verbal content. Moreover, these aspects were also relevant for distinguishing the concert stream preference groups we had identified earlier.

We were interested in the strength and nature of format influences regarding various dimensions of the concert and music experience. Furthermore, we wanted to study the potential interaction effects of person-related factors, in particular streaming preferences.

In addition to these general questions, we formulated the following concrete research questions regarding the effects of streaming formats:

Q1: Do on-demand streams attract larger audiences than a stream with fixed dates and times?
Q2: Is a short stream more attractive than a longer stream, at least for certain audience groups?
Q3: Can the opportunity to interact virtually with other audience members increase feelings of social connectedness?
Q4: Does additional information lead to a better comprehension of the programming and the contemporary classical piece?

Method

An online experiment was conducted with four versions of a professional audiovisual recording of a classical chamber music concert featuring string quintets by Ludwig van Beethoven (C minor, op. 104, first movement only), Brett Dean ("Epitaphs"), and Johannes Brahms (G major, op. 111). To capture participants'

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concert stream experiences, they filled out an entry questionnaire before the stream and an exit questionnaire after it.

Participants

A total of $N = 631$ persons ($M_{age} = 53.46$ years, $SD = 14.07$ years, 59.30% women, 92.2% living in Germany, 83.10% with university degree, 75.40% living in an urban area, median number of live performances of classical music visited in 2019 = 10) participated in the study, of which $n = 11$ dropped out during the entry questionnaire, $n = 82$ during the stream, and another $n = 9$ while taking the exit questionnaire. Four participants were excluded from the dataset after visual inspection of boxplots to identify outliers. The final number of complete datasets was $n = 525$. Recruitment took place in a related earlier study, via an independent online survey that asked classical music listeners about prior experiences with concert streams and their preferences regarding a number of features of such streams ($N = 1{,}640$; see *reference masked for review*). Participants were also asked whether they would like to take part in a follow-up experiment. Those who indicated their interest ($n = 1{,}301$) were randomly assigned to one of four equally sized sub-groups that were similar in terms of age, gender, education, place of residence, and number of concerts visited in 2019. Sub-groups were then randomly assigned to one of the four stream variants to avoid self-selection bias. Each sub-group received an invitation to watch the concert stream they had been assigned to, which included a link to the video and, in the case of stimulus 3 (a stream with online social interaction), the possibility to sign up for one of the streaming dates. They were not informed about the concrete stream type they would watch.

Participation was as follows: Stream 1 = 159 participants who finished the entry questionnaire, of those, 133 participants also completed the exit questionnaire; Stream 2 = 170 entry questionnaire, 143 exit questionnaire; Stream 3 = 124 entry questionnaire, 107 exit questionnaire; and Stream 4 = 167 entry questionnaire, 144 exit questionnaire. ANOVAs and χ^2 tests showed that the sociodemographic composition of these sub-samples did not differ significantly from each other.

Stimuli

The concert program comprised a work each by Beethoven and Brahms and a contemporary quintet by Dean. The pieces were chosen because they shared the topic of remembrance and the end of life, being either late works that reflected upon the composer's own oeuvre (Beethoven, Brahms), or works that explicitly commemorated deceased friends and colleagues (Dean). The order of the pieces was in keeping with standard approaches to classical concert programming.

A professional video recording of a concert on 12 September 2020 at Radialsystem, a concert and performance venue in Berlin, Germany, was produced using three cameras and uploaded to the video platform Vimeo. The concert was performed by a group of internationally renowned instrumentalists: Baiba Skride (first violin), Gergana Gergova (second violin), Brett Dean (first viola), Micha Afkham (second viola), and Alban Gerhardt (violoncello). The musicians were seated in a semi-circle on the stage in front of a black background.

The video followed the standards of filming classical concerts: Shots of the entire ensemble alternated, depending on the musical structure, with partial views or close-ups of individual performers. On the basis of this video, four streams were created as experimental stimuli (see Table 1): (a) a long version lasting 75 min, which served as the baseline condition as it most closely represented standard concert program and broadcast; (b) a 40-min short version (without movements 4 and 5 of Dean's "Epitaphs" and without the first movement of Brahms's op. 111); (c) the short version embedded on the platform Spatial Chat to enable social interaction between audience members before and after the concert; and (d) the short version that included an 11-min introductory talk by (*name masked for review*), artistic director of the *masked* project and founder of Radialsystem, and composer Brett Dean. The talk explained the overall dramaturgy of the concert program and in particular the idea behind Dean's piece, which is about the memory of close friends and colleagues who had passed away. Dean explains that the focus of the piece is on the living memory of the deceased and setting their energy to music, rather than the tragic losses themselves. He also reflects on the piece and its upcoming performance against the backdrop of the Covid-19 pandemic and his own experience with a severe course of the disease.

In general, all streams differed from each other regarding only one aspect. The social stream, however, also came with the need to change from on-demand to fixed-date access. We do not expect this to corrupt our subsequent analyses, though, because the influence of both features can be addressed separately.

The following aspects were considered when designing the four video streams: (a) They should represent a variety of existing classical music streaming features, for example, differing duration, on-demand versus fixed-date access, or interaction possibilities. (b) Features that showed large preference differences in our earlier study should be included, for example, duration, access, interaction possibilities, or media extension. (c) Also, we wanted to further explore effects that were found in previous studies on liveness, audience engagement, the experience of digital concerts, and digital media use in general, for example, regarding the importance of a social dimension, created through temporal co-presence and interaction possibilities, the relevance of introductory talks ("arts talk," Conner, 2013), in particular for less frequent and first-time concert attenders, but also as a means of elucidating the curation of the concert program and promoting increased concentration on and understanding of the music, thus making also contemporary and complex works more accessible, or the impact of ever shorter digital media content on viewers' attention spans. The above-mentioned research questions were then derived from the actual differences between streams.

Questionnaire Design

The following item batteries were used to form the questionnaires: Both questionnaires featured item batteries asking about the participant's present emotional state (PANAVA-KS; see Schallberger, 2005); the entry questionnaire included questions regarding the general importance of 13 main concert features and expectations of 18 experience aspects; the exit questionnaire included questions regarding the evaluation of the same 13 concert features and actual experience of 18 experience aspects. In addition, the exit questionnaire included a 22-item scale on listening modes (items adopted from Rössel, 2011) as well as ratings of six aesthetic emotions per piece (derived from the AESTHEMOS scale; see Schindler et al., 2017). The questionnaire also included other questions about

Table 1
Overview of Stimuli (Streaming Formats) and Their Characteristics

	Streaming format			
Characteristic	1: Long	2: Short	3: Social	4: Information
Duration	Long	Short	Short	Short
Access	On demand	On demand	Fixed date and time	On demand
Special feature			Social interaction via chat	Introductory talk

participants' sociodemographic characteristics together with questions about their tastes and engagement with (classical) music.

Experimental Procedure

Participants in the sub-groups assigned to Streams 1, 2, and 4 were sent an invitation to participate, following which they had the option to begin the experiment at any time during an 8-week period. The entry questionnaire was accessed via a link in the invitation email in combination with a personalized token. After completing the questionnaire, a link at the end took them to a new webpage where the concert video was embedded for streaming. Just as in any other streaming offer, the participants were able to start, stop, fast-forward, and rewind the video using the play button. At the end of the concert, a button appeared below the video that redirected participants to the exit questionnaire.

The group assigned to Stream 3 (the social stream) first received a link to register for one of five different dates for the joint concert via Spatial Chat (four with a moderation in German, one with it in English, each at 20:00 CET on various weekdays). The participants were distributed relatively evenly among the different dates (20–40 people each). At the time of their concert, participants entered a personalized start page via a link in the invitation email and were transferred from there to the corresponding Spatial Chat room. Once they had entered the Spatial Chat room, the participants were welcomed by a moderator in the "foyer," who explained the process of the experiment and the functions of Spatial Chat to them. In addition to the foyer, there were three other virtual 2D rooms: the questionnaire room, the concert hall, and the socializing room, each of which could be accessed via a menu bar. Once in a room, participants could move around their avatar, a thumbnail video of themselves, with the help of drag and drop. After the introduction and getting to know each other, the participants entered the questionnaire room together and started the entry questionnaire via the links provided in their invitation emails. Once all participants completed the questionnaire, they entered the concert hall together. Participants could choose one of the "seats" surrounding the video window in the center of the room. Participants were muted to ensure that everyone could enjoy the music undisturbed. Nevertheless, participants could still communicate with each other writing in the chat and express liking or disliking in the form of exclamations or emoticons. After the concert, everyone returned to the questionnaire room to fill out the exit questionnaire, following which they had the opportunity to enter the socializing room. Here, they could talk with each other in smaller or larger groups about the concert and their experiences of it.

Data collection took place between December 2020 and March 2021.

Results

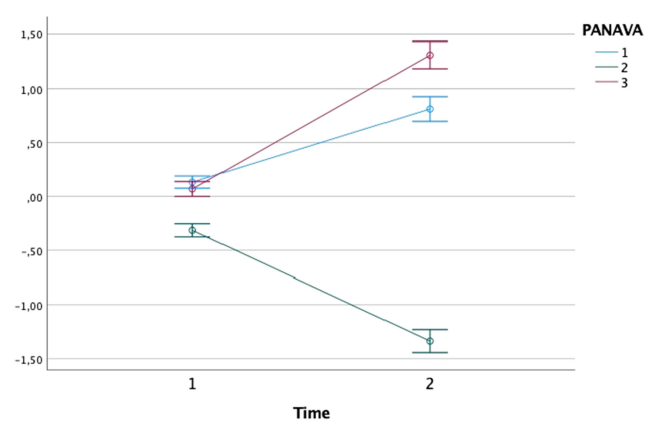
Measures of Concert Experience

Our questionnaires included domain-specific and domain-independent measures of experience. Domain-specific measures were three-item batteries to capture appreciation, experience, and listening modes. As an indirect, domain-independent way to assess the affective quality of participants' concert experience, we used the PANAVA scale, which measures (changes of) positive activation (PA), negative activation (NA), and valence (VA; Schallberger, 2005).

Paired *t*-tests showed that postconcert PANAVA scores differed significantly from pre-concert scores (see Figure 1). Across all stream formats, people felt more positive activation, $M_{\text{change}} = 0.78$, $SD = 1.19$, $t(533) = 15.12$, $p < .001$, and positive valence, $M_{\text{change}} = 1.35$, $SD = 1.48$, $t(533) = 21.10$, $p < .001$, and less negative activation, $M_{\text{change}} = -1.11$, $SD = 1.23$, $t(533) = -20.21$, $p < .001$, which means they had a music experience that improved their subjective state. Effect sizes were medium for positive activation (Cohen's $d = 0.65$) and large for negative activation and valence ($d = 0.90$ and 0.91).

We conducted an exploratory principal component analysis (PCA) with Varimax rotation over all three domain-specific item batteries (appreciation, experience, listening modes) to reduce the number of dependent variables and to identify the main dimensions of a concert experience. We found nine factors with Eigenvalues > 1.00

Figure 1
Mean Pre- and Postconcert PANAVA Scores



Note. Errors bars are 95% confident intervals. Time 1 = before the concert stream, Time 2 = after the concert stream. PANAVA 1 = positive activation, 2 = negative activation, 3 = valence. See the online article for the color version of this figure.

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that explained 56.78% of the total variance. Seven of these factors were labeled as follows: *Immersion and being moved*, *Appreciation*, *Intellectual stimulation*, *Analytical listening*, *Social experience*, *Concentration*, and *Understanding*; and new items were computed from the factor scores (method: mean of all items with loadings of ≥0.50 on a factor). The eighth and ninth factors were excluded from further analyses since factor 8 seemed very similar to the factor Concentration (negative loadings for items "mind-wandering" and "reduced attention") and factor 9 consisted of only one item of little importance for this study ("I paid particular attention to a specific instrument"). Table 2 lists all items with loadings ≥0.50 for the seven factors, while Figure 2 shows the distribution of the resulting mean factor scores in the form of boxplots for all four streams together. While appreciation ratings were high and audience members reported having been intellectually stimulated and able to concentrate during the concert streams, rewarding experiences such as immersion and being moved, as well as social connection, were felt only rarely.

Some of the resulting dimensions were relatively strongly correlated with each other, in particular appreciation, immersion and being moved, intellectual stimulation, and concentration ($r = .43–.65$).

Main Effects of Stream Type on Participation and Experience

We will first report the results regarding our concrete research questions then look more exploratively at the effects of stream format and preference on experience dimensions and PANAVA measures.

Table 2
Item Loadings for Seven Main Dimensions of Concert Appreciation, Experience, and Listening Mode

Item	Immersion and being moved	Appreciation	Intellectual stimulation	Analytical listening	Social experience	Concentration	Understanding
I rediscovered my feelings in the music.	0.681						
I gave myself over to the music.	0.677						
The music got under my skin.	0.674						
I listened with feeling.	0.668						
I felt the music partly physically.	0.661						
I immersed myself in the sound.	0.633						
I liked to dream to myself.	0.575						
I felt less alone.	0.566						
The music took my mind off things, drove unpleasant moods out of my head.	0.547						
I felt like crying.	0.529						
I paid attention to what feelings were expressed through the music.	0.524						
I was captivated by the rhythm.	0.512						
I was touched/moved emotionally.	0.505						
Liking of musicians		0.720					
Liking of the concert overall		0.678					
Liking of the musical interpretation		0.670					
Liking of the acoustics		0.618					
Liking of experiencing the musicians' live		0.593					
Liking of the atmosphere		0.590					
Liking of the venue		0.546					
Liking of the staging		0.521					
I could experience the beauty of the music.		0.510					
I was surprised by new impressions.			0.679				
I was able to expand my understanding of music.			0.630				
I was able to get to know new works.			0.604				
The concert made me think.			0.591				
I paid attention to the style of the composer.				0.781			
I listened for change of key.				0.767			
I tried to understand the formal structure.				0.765			
The skill of the musicians was important to me.				0.628			
I was able to meet friends and acquaintances.					0.693		
Liking of the opportunity to be with others before and after the concert					0.651		
I could be in a place where I feel connected to others.					0.645		
I had a good time with my companions.					0.644		
I was able to experience being part of the audience.					0.616		
I was able to concentrate entirely on the music.						0.641	
I was disturbed by background noises or something else.						−0.617	
I was able to immerse myself in the music with all my senses.						0.511	
Liking of information about the pieces							0.652
Being able to recognize the theme of the concert							0.621

Note. Results of a principal component analysis with varimax rotation.

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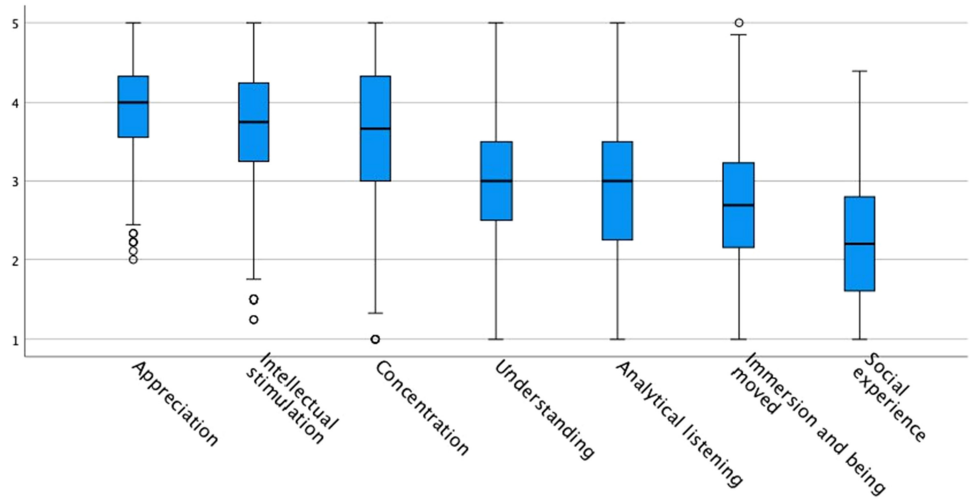
Figure 2

Boxplots of Seven Main Factors of Concert Appreciation, Experience, and Listening Mode



Note. Items sorted in descending order. See the online article for the color version of this figure.

On-Demand Access Versus Fixed-Date Access

A roughly equal number of participants of the pre-survey were invited to each stream ($n = 317$–331). A χ^2-test showed that access options had a small effect on participation rates. While 49.80%–52.80% of those invited to the on-demand streams started the study, this was the case for only 39.40% of those invited to the social stream with fixed-date access ($\chi^2 = 14.38$, $p = .002$, Cramer-$V = 0.11$).

Duration

We used several methods to assess the potential effect of stream duration. In a first step, we analyzed dropout rates, which did not differ significantly across stream types. Of participants watching the long stream, 13.20% dropped out—a similar proportion amongst viewers of the short streams ($\chi^2 = 0.10$, $p = .992$). Stream duration also had no effect on postconcert PANAVA ratings or experience dimensions overall.

In a next step, we explored group differences on the PANAVA ratings, as well as the factors *Immersion and being moved* and *Appreciation* since we had found differing preferences for stream duration in our earlier study (*reference masked for review*). Specifically, participants in the Less engaged group had reported being less likely to watch a longer stream than a shorter one. One-way MANOVAs revealed a significant medium effect of preference group on concert experience and appreciation in the long stream, but not in the short stream; long stream: $F(10, 248) = 3.21$, $p = .001$, $\eta_p^2 = 0.11$, Wilk's $\Lambda = 0.78$; short stream: $F(10, 274) = 1.30$, $p = .231$. Posthoc tests showed that in the long stream, the Less engaged group gave consistently lower ratings than the Enthusiasts for *Immersion and being moved*, *Appreciation*, and *Negative activation*, which was in line with the results of our earlier study (F-statistics and group differences for each posthoc test are shown in Table 3).

Social Interaction

We expected that inviting audience members to watch a stream together with others at a given date (temporal co-presence), and giving them the opportunity to meet and interact virtually with each other before and after the concert stream on a chat platform, would at least in part make up for the lack of physical co-presence and add a social dimension to the concert stream. Inasmuch as we assumed that a possible effect of social interaction (and any other feature, for that matter) would depend not only its presence or absence, but also on how its quality was perceived, we first looked into participants' evaluations of this specific stream feature. On average, participants in the social stream liked the opportunity to interact with others, although not to a very strong degree ($M = 3.54$, $SD = 1.00$). These ratings were significantly higher than in the other streams, as a contrast testing for a difference of the social compared to all other streams showed: $M_{\text{difference}} = 0.97$, $T(524) = 9.42$, $p < .001$, $d = 0.96$. An ANOVA with contrasts was used to test the effect of the social stream on the factor *Social experience*. We found a medium-sized difference between the social stream and all other streams such that the social stream increased social experience ratings by 0.58 on average: $T(524) = 7.30$, $p < .001$, $d = 0.73$ (see Figure 3).

Information

The information stream was designed to increase the understanding and appreciation of the performed pieces—in particular the contemporary piece—and the overall program. An ANOVA with contrasts showed a medium effect of stream format on the relevant experience factor *understanding*; $M_{\text{difference}} = 0.96$, $T(524) = 13.53$, $p < .001$, $d = 0.73$. On average, people reported liking the information provided and being better able to recognize the overall topic.

Piece-related effects were tested by analyzing the evaluative AESTHEMOS ratings for Brett Dean's piece. While there were no differences in how beautiful and interesting participants found the work by Dean across streams, beautiful: $T(522) = -0.31$, $p = .760$, interesting: $T(521) = 0.52$, $p = .603$, participants of the information stream reported stronger feelings of melancholy; $M_{\text{difference}} = 0.76$, $T(522) = 6.39$, $p < .001$, $d = 1.22$; see Figure 4.

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Table 3
One-Way MANOVA Testing for Preference Group Effects in the Long Stream; F-*Statistics of Posthoc Tests*

Independent variable	F (2, 127)	p	η^2	Group differences
Immersion and being moved	5.42	.006	0.08	Less engaged < Enthusiasts
Appreciation	8.44	<.001	0.12	Less engaged < Purists and Enthusiasts
Positive activation	2.84	.062		
Negative activation	8.38	<.001	0.12	Enthusiasts < Less engaged and Purists
Valence	2.78	.066		

Exploratory Results

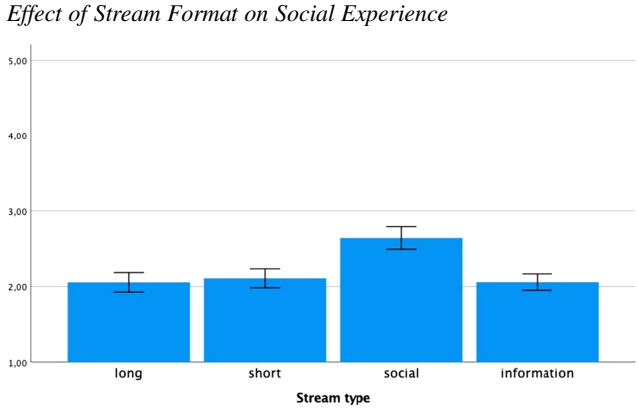
In addition to our concrete research questions, we were also interested in other potential effects of stream format and preference group on concert evaluation and experience. A two-way MANOVA with postconcert PANAVA ratings and the seven factors as dependent variables revealed significant main effects of stream format and preference group, but no interaction effect—stream format: $F(30, 1{,}482.95) = 6.27$, $p < .001$, $\eta^2 = 0.11$, Wilk's $\lambda = 0.67$; preference group: $F(20, 1{,}010) = 2.79$, $p < .001$, $\eta^2 = 0.05$, Wilk's $\lambda = 0.90$; interaction: $F(60, 2{,}650.91) = 1.12$, $p = .253$. Tukey posthoc tests showed that in addition to the already explored effects of the social and the information stream, the social stream was also associated with lower scores for *Concentration* than all other streams: $F(3{,}514) = 5.61$, $p = .001$, $\eta^2 = 0.03$ (see Figure 5).

Preference group effects were more frequent, but always small: On all dimensions, Less engaged audience members had lower scores than the Enthusiasts, and on six dimensions, also than the Purists (for F-statistics, see Table 4).

Discussion

Music can never be listened to directly, only via mediators. One such mediator—or medium—is the live performance, one sub-type of it being audiovisual recordings and their different transmission media. Such media are entailed in music listening frames and can be assumed to influence how music is heard, experienced, and evaluated—although theoretical and empirical work in this area remain scarce (Wald-Fuhrmann et al., 2021). In this study, we examined the effects that different formats of audiovisual classical concert streams can have on various dimensions of the aesthetic experience of the music performed and how preferences for stream formats moderate these effects.

Figure 3
Effect of Stream Format on Social Experience



Note. Errors bars are 95% confident intervals. See the online article for the color version of this figure.

Out of a large number of items capturing appreciation, experience, and listening modes, we were able to identify seven experiential dimensions relevant for classical concerts. These were: (a) immersion and being moved, (b) appreciation, (c) intellectual stimulation, (d) analytical listening, (e) social experience, (f) concentration, and (g) understanding of the pieces and the program. These dimensions may enable us to develop a better and more differentiated conceptual understanding of aesthetic experiences (of music). But they might also be relevant for inquiries into whether and how different art forms, styles, genres, and media are related to different types of aesthetic experiences (regarding style-specific types of aesthetic experiences of music, see Mencke et al., 2023).

Overall, our streams afforded listeners a positive aesthetic experience: As an indirect measure of this, participants reported higher degrees of positive activation and valence and lower degrees of negative activation (PANAVA scale) after watching the streams than they had beforehand. For the experience dimensions, however, a certain disconnect between the more cognitive and the more emotional experience dimensions was evident. Cognitive dimensions such as appreciation, intellectual stimulation, and concentration were more present than were experiences of immersion and being moved and social experiences. This is in line with everyday assumptions and the earlier, albeit scant, empirical evidence suggesting (a) that the broadcast of a musical performances yields a weaker aesthetic experience than does the live event (Shoda & Adachi, 2012, 2015; Shoda et al., 2016; Swarbrick et al., 2019), and (b) that people attend live music performances in order to have a particularly intense experience, one brought about by feeling not only deeply connected to and immersed in the music but connected to other audience members and the musicians as well (Brown & Knox, 2017; Burland & Pitts, 2014; Charron, 2017; Dearn & Price, 2016; Kjus & Danielsen, 2014).

Some of the aforementioned aspects and dimensions of an aesthetic experience of music were influenced by streaming formats, that is, by features such as access mode (on demand vs. fixed-date), duration, social interaction of audience members, and additional information. Effects occurred mostly in the social and the information stream: As expected, the social stream—in which participants had the chance to meet and interact with each other before and after the stream via a chat platform—increased the social dimension of the concert experience. This is accorded with earlier studies showing that audience interaction on social media platforms had a positive effect on feelings of social connectedness (Bennett, 2014; Nguyen, 2018; Onderdijk et al., 2021). Again, however, it was the evaluative item that was rated most positively and for which we

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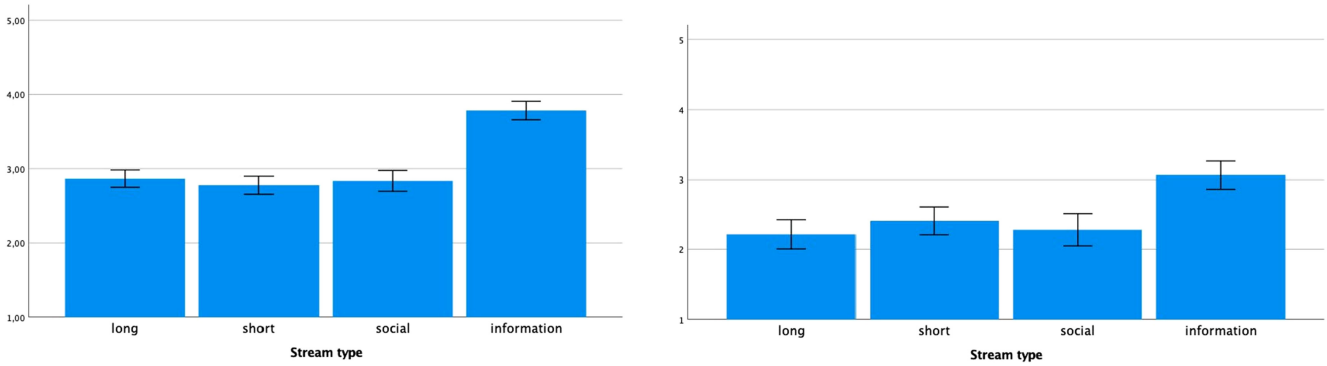
Figure 4
Effects of Stream Format on Understanding and Feeling Melancholic



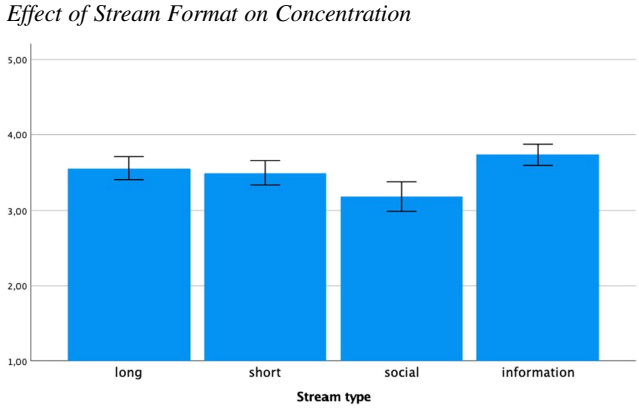
Note. Errors bars are 95% confident intervals. See the online article for the color version of this figure.

found the greatest effect (rating of "The possibility to be with others before and after the concert"); whereas there was only a medium effect for the dimension *Social experience*, which did not have an average >3.00, meaning that people's social experience was still relatively weak. In turn, the social stream was associated with lower ratings for *Concentration*.

A similar pattern emerged for the information stream. In addition to the expected the concrete effects on the cognitive dimension *Understanding*, we found only one significant effect on an emotional experience, that is, experiencing Dean's "Epitaphs" as melancholic.

The different experience profiles that emerged for the social and information streams respectively may have several implications. First, the differences between them show that there may be an inherent conflict between the musical-immersive and the social dimension of music experience in a concert. If attention is directed toward other audience members, this may come at the expense of its being directed toward the music. Historically, this can be seen as the primary reason behind the implementation of strict behavioral regimes for concert audiences in the 19th century: To the extent that works composed for concert performances grew in complexity and artistic demand, audience members had to sit still and quietly to be able to allocate their entire attention to the music and to not disturb others' concentration (Heister, 1983; Johnson, 1995; Thorau & Ziemer, 2019). Second, the differences between the experience profiles corroborate our main assumption that formats matter. While we might have expected a generally positive influence of formats with additional features, so far, our results suggest rather feature-specific effects of formats that lead not to an overall intensification of the experience, but to the emergence of qualitatively distinct types of experiences.

Figure 5
Effect of Stream Format on Concentration



Note. Errors bars are 95% confident intervals. See the online article for the color version of this figure.

Individual preferences regarding stream features also influenced how participants experienced the concert streams. Small effects of the preference group were found for all PANAVA and experience dimensions. Typically, the Less engaged group gave the lowest ratings, while Enthusiasts of concert streams gave the highest ratings. The Purists, who had reported preferring some potential stream features over others, were similar to the Enthusiasts regarding most cognitive dimensions (*Appreciation*, *Intellectual stimulation*, *Concentration*, *Understanding*) and positive and negative activation, but similar to the Less engaged group in terms of *Social experience*. Preference group effects differed, however, with respect to individual stream formats. In particular, the long stream seemed to have had some disadvantages for Less engaged audience members. The short, social, and information streams, however, were mostly able to neutralize preference group effects. This indicates that a well-made and well-performed concert (stream) can level out attitude differences. It may also inspire musicians and producers to create concert streams that do not simply mirror standard concerts but that compensates for the inherent disadvantages of concert broadcasts in a creative way. As a result, they may also attract and satisfy people who are generally less interested in concert streams.

This study is one of the first to experimentally study frame effects on the aesthetic experience of music by keeping the musical stimulus (pieces and performance) the same and manipulating only features of the frame (in our case, audiovisual concert streams). It is clear, however, that each of our streams represents only one of an indefinite number of potential aesthetic actualizations of the targeted format. Therefore, it is still impossible to generalize the frame effects we found, even in the context of classical music. Further, the correlation

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Table 4
Two-Way MANOVA, F*-Statistics of Posthoc Tests for Preference Group Effects*

Independent variable	F (2, 514)	p	η^2	Group differences
Immersion and being moved	14.08	<.001	0.05	Less engaged < Purists < Enthusiasts
Appreciation	8.21	<.001	0.03	Less engaged < Purists and Enthusiasts
Intellectual stimulation	11.69	<.001	0.04	Less engaged < Purists and Enthusiasts
Analytical listening	4.68	.010	0.02	Less engaged < Enthusiasts
Concentration	4.99	.007	0.02	Less engaged < Purists and Enthusiasts
Social experience	8.18	<.001	0.03	Less engaged and Purists < Enthusiasts
Understanding	5.42	.005	0.02	Less engaged < Purists and Enthusiasts
Positive activation	4.46	.012	0.02	Less engaged < Purists and Enthusiasts
Negative activation	5.38	.005	0.02	Purists and Enthusiasts < Less engaged
Valence	6.15	.002	0.02	Less engaged < Enthusiasts

between appreciation, intellectual stimulation, and immersion and being moved points to a potential key aspect of aesthetic effects: They are not a direct result of certain stimulus features, but are mediated by recipients' listening modes and individual appreciation.

Our study was conducted in Germany during the most severe wave of the COVID-19 pandemic and while several containment measures ("lockdown") were in place that affected the work and private lives of the entire population. Studies have documented that for many, the pandemic caused enormous psychological stress (Clemente-Suárez et al., 2020), and also that musical engagement provided a widespread strategy to cope with negative emotions such as sadness, stress, and anxiety, as well as the lack of social support by other people (see several contributions in Hansen et al., 2022) with COVID-specific forms of music and musical engagement being particularly effective (Fink et al., 2021). Thus, we need to acknowledge that the pandemic situation most certainly had an impact on the affective state of our sample, their availability and willingness to participate and their concrete experience, although we are not able to exactly identify the type and degree of that impact. But we do not expect these influences to have distorted the results concerning stream format and preference effects.

The discussion about concert formats and the role concert streams and broadcasts might play even after the ongoing COVID-19 pandemic is widespread and timely (not only) in the field of Western classical music. Apart from aesthetic aspects, issues of societal relevance such as climate effects and accessibility for underrepresented audiences have been brought up. Empirical and experimental research into the effects of different formats of live and streamed concerts on audience development, arts participation, and the various dimensions of an aesthetic experience of music can provide musicians, sound engineers, music dramaturgs, artistic directors, and others active in this field with additional evidence that may help them to experiment artistically with forms and formats and to select the concert (stream) format that best fits a specific concert program, the artists' aesthetic vision, and the audience's characteristics. Thus, concert broadcasts and streams can further develop into independent musical media that promote participation and equal opportunities by providing meaningful aesthetic and social experiences also for people who may not be able to attend live concerts, such as people who live far away from a concert hall, are immobile due to age or health reasons, cannot afford a ticket, or have a disability. Lowthreshold, interactive formats have also been discussed regarding their appeal to concert novices (Tröndle, 2022).

Lastly, our approach and findings may help to motivate more experimental studies on frame effects on the perception, appreciation, and experience of aesthetic stimuli in the fields of music psychology or empirical aesthetics more generally.

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