



The lost value for users of cultural institutions during the COVID-19 pandemic: a life satisfaction approach

Andrea Baldin^{1,2} · Trine Bille¹

Received: 13 January 2023 / Accepted: 28 April 2023 / Published online: 12 May 2023
© The Author(s), under exclusive licence to Springer-Verlag GmbH Germany, part of Springer Nature 2023

Abstract

Studies related to the assessment of the non-market values of culture typically employ methods based on stated or revealed preferences. In this paper, we implement a new emerging non-market valuation technique, namely the life satisfaction approach. In particular, we quantify in monetary values, the additional utility that people benefit from cultural experiences, as well as the additional disutility suffered by cultural consumers specifically due to the closure of cultural organisations during the COVID-19 pandemic, as the pandemic provides a unique setting. Using a survey conducted in Denmark in the spring of 2020, we confirm the link between cultural participation and well-being by estimating a life satisfaction model, instrumenting for both income and cultural participation to avoid simultaneity problems. Furthermore, we show that fervent cultural consumers have experienced an additional welfare loss during the lockdown period, controlling for all other known life dimensions affected by the pandemic. Our results aim to highlight the role of cultural participation in sustaining life satisfaction and, consequently, to support a well-being evidence-based cultural policy that facilitate cultural accessibility as a mean to increase the individual well-being.

Keywords Life satisfaction · Subjective well-being · Non-market valuation · Museums · Theatres · COVID-19

JEL Classification H44 · I31 · Z10

✉ Andrea Baldin
andrea.baldin@unive.it

Trine Bille
tb.bhl@cbs.dk

¹ Department of Business Humanities and Law, Copenhagen Business School, Porcelaeshaven 18B, Frederiksberg, Denmark

² Present Address: Department of Economics, Ca' Foscari University of Venice, San Giobbe, Cannaregio 873, 30121 Venezia, Italy

1 Introduction

Understanding and assessing the economic value of arts and culture has long been a major focus of research in cultural economics (see, for example, Bille Hansen 1997; Fujiwara et al. 2019; Wisniewska and Czajkowski 2019). The arguments are based on the recognition of the nature of cultural products, such as performing arts, museums and cultural heritage, as providers of positive externalities from which everyone can benefit regardless of the level of cultural consumption.

In this paper, we aim to value the impact on individuals engaging in cultural institutions, in particular theatres and museums. This framework appeared most relevant in the context of the COVID-19 pandemic, where cultural organisations have been severely hit by the lockdown-type measures enforced. In Denmark (the geographical scope of this paper), on 16 March 2020, the government imposed the closure of non-essential activities, a category that included museums, theatres, concert venues, and in general all cultural activities requiring the physical presence of an audience. These closure measures have had a marked effect on cultural consumption patterns, with a rise in demand for cultural services that require digital access, as well as an increase in cultural leisure activities (such as reading, listening to music, etc.) that help individuals to cope with the COVID-19 crisis (Tubadji 2020; Radermecker 2021), mitigating many of the negative impacts that lockdown had on the individuals' well-being (Ascolani et al. 2020). However, the cultural activities that could not be attended during the period (such as live events) are the ones exhibiting a crucial contributory feature to individual well-being, i.e. social interaction (Ateca-Amestoy 2011). Not all types of cultural activity are equally relevant for individual well-being; among the different forms of cultural participation, Ateca-Amestoy et al. (2016) finds that attendance-based cultural participation contributes more to individual happiness than home-based activities (reading books, watching TV and videos, listening to music). As Bryson and MacKerron (2017) show among the 39 leisure activities considered in their study, "theatre, dance, concert" and "exhibition, museum, library" are respectively ranked second and third in their relevance to the reported happiness, behind "intimacy and lovemaking" and ahead of other cultural activities such as "singing and performing" (6th), "listening to music" (17th) and "reading" (26th).

Given the acknowledged impact of engagement with arts and culture on individual well-being (see among others Michalos and Kahlke 2010; Brajsa-Zganec et al. 2011; Grossi et al. 2012; Hand 2018; Wheatley and Bickerton 2019), the purpose of this paper is to implement the life satisfaction approach (LSA) in order firstly to provide a monetary value for the welfare gain that cultural consumers (specifically, theatregoers and museum visitors) get from their cultural experiences; secondary to explore whether these cultural consumers have experienced a greater decline in well-being compared to non-cultural consumers, keeping fixed the other negative effects of the pandemic on personal life. Additionally, we estimate a monetary value for such welfare decline, i.e. lost use value.

The paper is structured as follows: Sect. 2 defines values of culture and presents the life satisfaction approach (LSA), comparing this technique with the

preference-based ones. Section 3 presents the survey design, data collection and the variables used. Section 4 describes empirically the LS models including how we overcome the endogeneity issue, which is a common issue in the estimation of the life satisfaction equation, and shows the estimated results; similarly, Sects. 5 and 6 extend the models considering the COVID-19 lockdown period as a unique setting to analyse the loss of well-being experienced by cultural consumers. Finally, Sect. 7 provides some conclusions.

2 Values and economic valuation of cultural institutions

The cultural economics literature has put a great deal of effort into understanding the values of cultural products and, if possible, estimating this value by economic valuation methods.

The total value of a cultural good is made up of the market value plus the non-market values.

The market values of private goods are generally elicited through market prices. However, in the case of cultural institutions, the market price is the cost of a ticket to attend a theatre performance or visit a museum, which is very low because of substantial public subsidy. In Denmark, as in many other western countries, public subsidy amounts to approximately 80% of the total budget of these institutions (Hjorth-Andersen 2013), making it possible to keep prices low. This is an integrated element of cultural policy in most western countries, with the explicit purpose of democratisation of culture: everyone, whatever their level of income, shall be able to participate in the arts and cultural activities. In other words, market prices cannot be used as an indicator of value, and a substantial consumer surplus for users must be expected.

Furthermore, substantial non-market benefits are to be expected, primarily in the form of consumer externalities not traded in the market. These benefits take many forms, often referred to as existence, bequest and optional values (Frey and Pommerhne 1989). In addition, it is to be expected that participation in the arts has benefits beyond the individual utility, for example, the role of culture in developing engaged citizens, promoting civic behaviour, engaging with others, as well as its impact on mental and physical health (Crossick and Kaszynska 2016). If this is the case, engaging in cultural activity will not only provide utility for the user, but will have wider positive impacts on society.

Among the different techniques economists have developed to measure non-market values, the contingent valuation method (CVM) has gained great popularity in cultural economics (Snowball 2008). CVM requires respondents to attach a value (WTP) directly to the non-market goods in a hypothetical scenario, and it assumes that respondents are able to consider all the consequences of a change in the provision of the public good.

Choice experiments (CEs) are a related method, which likewise relies on individual responses to hypothetical market scenarios (plus the status quo), each of which is characterised by different levels of attributes of a non-market good. This hypothetical nature of CVM and CE surveys can lead to biased responses from respondents

(warm glow, protest bids, free-riding); furthermore, WTP answers in the CVM can also be influenced by the format of the questions (elicitation effects), while cognitive difficulty in considering different alternatives with multiple attributes can be high in the CE.

The life satisfaction approach (LSA), on the other hand, is not based on hypothetical scenarios, and the respondents are not asked to give a direct evaluation of non-market goods, as this is inferred on the basis of respondents' evaluation of their lives and real experiences (in our case, engaging with cultural organisations or not), avoiding strategic or superficial answers. The LSA, also known as the subjective well-being approach, relies on the increasing body of research indicating that the individual self-assessment of life satisfaction elicited through surveys is a valid, reliable and stable measure of individual welfare (utility) and can inform public policy (Dolan and White 2007; Frey et al. 2010; OECD 2013). Following a regression-based approach, LSA assesses the impact of both income and non-market goods on life satisfaction. Thus, the monetary value of the non-market good (consumer surplus) is estimated and interpreted as the amount of money required to keep life satisfaction constant when there is a change in the provision of the good.

In this sense, LSA shows similarity with the revealed preference techniques, a (less used) set of methods to estimate the WTP for non-market goods, relying on observed behaviour in the market that partially embodies non-market goods. The main concerns of revealed preference methods rely on the difficulty in isolating the impact of the cultural good on market prices (when applying the hedonic price method, for example, the impact of a cultural good on people's utility is only tangentially reflected in property prices) and the assumption of a perfectly competitive market in which the valuations are inferred. The latter assumption is not required in the LSA, which is a significant advantage over the revealed preference methods.

All this seems to speak in favour of LSA rather than alternative approaches; however, LSA is not without its drawbacks. The main concern relates to the endogeneity of the income variable and, in some cases, of the variable corresponding to the good under analysis. This point will be discussed further in Sect. 4.

Despite the growth of LSA research, to the best of our knowledge, there are few examples of this approach in the cultural field: Marsh and Bertranou (2012) have estimated the monetary value of the well-being impact involved in going to the cinema and attending concerts; similarly, Fujiwara et al. (2014) include a wider range of cultural activities, including sports activities, while Bakhshi et al. (2015) focus on the impact of a visit to the Natural History Museum and to Tate Liverpool in London.

3 Survey design and data collection

The data have been collected through a major survey of a random sample of 4450 Danes above the age of 18 years. The survey was distributed by Statistics Denmark (Statistics Denmark is the central authority on Danish statistics) in the period

between mid-May and mid-June 2020, during the initial stage of the pandemic.¹ In that period, lockdown measures relating to the closure of cultural organisations were still in place. The questionnaire was distributed as a web survey by Statistics Denmark to the respondents' official digital mailbox (e-Boks); for those unable or unwilling to respond to the web survey, the survey was conducted on the telephone by trained interviewers from Statistics Denmark (around 3% of the sample).

The resulting survey data has been merged with 2019 register data from Statistics Denmark consisting of a combination of labour, income and education data, which include sociodemographic and economic information such as age, gender, annual personal and household incomes, education, etc. Via the individuals' personal identification numbers (CPR number), it is possible to link the survey data with information from the public registers in Statistics Denmark at the individual level (micro data).

The survey was tested in three focus groups before the final version was formulated. The first part of the survey contains the two life satisfaction questions: one considers the period before the COVID-19 outbreak, asking the respondent as to recall his/her life as it was before the pandemic; the other question asks the respondent about his/her life satisfaction in the current period. The specific wording of the twofold question, which recalls the British Household Panel Survey,² was: *How satisfied are (were) you with your life overall?* The answers range from 0 (very dissatisfied) to 10 (very satisfied), with 5 corresponding to "neither satisfied nor dissatisfied". The survey also asked whether the Corona crisis had improved, left unchanged or worsened the respondent's life in seven different aspects: job situation, job security, financial situation, income security, physical health condition, mental state and stress level. Other questions related to specific factors that can affect life satisfaction were asked, such as degree of socialisation, handicap condition and experiences of tragic events. The position of the life satisfaction question in this part of the survey was randomised so that we can control for the ordering effect (Kaplan et al. 2013; Weinberg et al. 2018); half of the respondents received the life satisfaction question first, followed by the specific questions related to the degree of socialisation, handicap condition, experience of tragic events and the effects of Corona on their life (general-specific format); the other half received the questions in the inverse order (specific-general format).

The second part of the survey aims to find out the degree of engagement with theatre. The questions therefore address consumption of theatre performances, expenditure and level of agreement in respect to statements concerning the role of theatres as public good. Similarly, the third part of the survey relates to museum participation.

The control variables used to estimate the LS equation are demographic and socio-economic characteristics, including the household income, which are identified in the literature as being determinants of life satisfaction. In addition, we include as a determinant of the life satisfaction the so-called reference income. The

¹ The World Health Organization (WHO) declared the COVID-19 global pandemic on 11 March 2020.

² <https://www.iser.essex.ac.uk/bhps>.

reference income underlies the idea that the individuals' well-being does not depend only on income in absolute terms, but also on the subjective perception as whether his/her income is able to satisfy his/her needs (Ferrer-i-Carbonell 2005; Vendrik 2013; Kaiser 2020). This perception is realised through comparison with other people (peers): the larger the income of the reference group, the lower the level of life satisfaction as this means a worse relative economic condition compared to other members of the social reference group. We consider the relative income as the average adjusted household income of the individual's reference group, where the latter is defined according to the province of residence, age and gender. Using the publicly available statistics of the Danish population,³ we derive the average adjusted household income for all the combinations of provinces (11), age brackets (13) and gender (2), leading to 286 reference income.

We also include as control variables two features related to the survey design, specifically concerning the ordering effect (variable *Version*) and how the survey has been operated (variable *Telephone*).

When measuring theatre/museum participation, both a dummy and a continuous variable are included. In the first case, the variable is equal to 1 if the individual has attended (visited) a theatre performance (museum) at least once in the previous 12 months. In the second case, the construction of the variable reflects the survey questions; for each theatre form (play, dance/ballet, opera, musical, stand-up/cabaret) and museum type (historical museum and art museum), we asked respondents to select one of the following options: never been, 1–2 times, 3–5 times, more than 5 times. Values are then assigned, from 0 (never been) to 3 (more than 5 times), and we sum all the values across the 5 different theatre types and 2 museum types.

All the variables considered are described in Table 1, together with summary statistics.

Considering the missing values and individuals who did not complete the survey, the final sample used for the theatre and museum model estimation is composed respectively by 1584 and 1534 individuals.

4 LSA model

We will present two different methodological approaches. In this section, we present the LSA model and the estimated results; in Sect. 5, we extend the analysis considering the COVID-19 lockdown period.

4.1 Methodology

A typical life satisfaction equation is specified as follows:

$$LS_i = \alpha + \beta_1 \ln(y_i) + \beta_2 Q_i + \beta_3 Z_i + \varepsilon_i \quad (1)$$

³ <https://www.statbank.dk/3434>.

Table 1 Variables and summary statistics

Variable	Description	Mean	St. dev	Min	Max
<i>Dependent variable</i>					
LS	Life satisfaction score, from 0 (very dissatisfied) to 10 (very satisfied)	7.993	2.044	0	10
<i>Independent variable</i>					
Ln income	Natural logarithm of the adjusted household income in 2019. The adjusted income is equal to the net household income divided by $0.5 + (0.5 \cdot \text{no. of persons over 14 years of age}) + (0.3 \cdot \text{n}^\circ \text{ of person under 15 years of age})$	12.53	0.531	8.022	15.19
Ln reference income	Natural logarithm of the average adjusted household income in 2019 of the individual's reference group	12.58	0.212	11.95	13.03
Theatre attendance	1 = individual has attended at least one theatre performance in the previous 12 months; 0 otherwise	0.485	0.500	0	1
	Sum of the n° of theatre performances attended in the previous 12 months (where 1 = 1–2 times; 2 = 3–5 times; 3 = more than 5 times)	1.067	1.717	0	12
Museum visits	1 = individual has visited a museum in the previous 12 months; 0 otherwise	0.554	0.497	0	1
	Sum of the n° of museum visits in the previous 12 months (where 1 = 1–2 times; 2 = 3–5 times; 3 = more than 5 times) for each of the two museum types	1.020	1.250	0	6
Disability	1 = individual has a physical or mental disability that impedes ability to move around the community; 0 otherwise	0.090	0.287	0	1
Shock event	1 = individual has experienced one or more tragic events in the previous 5 years; 0 otherwise	0.195	0.396	0	1
Social	Answer to the question: "Before the Corona crisis, how often did you see your friends and/or family for socialising in leisure time?"; from 1 (I did not see friends/family) to 6 (daily or almost daily)	3.985	1.072	1	6
Residential Property	1 = individual owns a residential property; 0 otherwise	0.518	0.500	0	1
Children	N° of children under 18 years of age	0.593	0.973	0	7
Age	Age of the respondent	52.46	17.99	18	92
Age-sq/100	Square of the age of the respondent divided by 100	30.76	18.51	3.240	84.64
Female	1 = the respondent is female; 0 otherwise	0.551	0.498	0	1
Widow	1 = the respondent is widowed; 0 otherwise	0.056	0.230	0	1
Divorced	1 = the respondent is divorced; 0 otherwise	0.122	0.328	0	1
Married	1 = the respondent is married; 0 otherwise	0.525	0.500	0	1
Danish	1 = the respondent was born in Denmark; 0 otherwise	0.931	0.254	0	1

Table 1 (continued)

Variable	Description	Mean	St. dev	Min	Max
Employed	1 = the respondent is employed; 0 otherwise	0.573	0.495	0	1
Student	1 = the respondent is in education; 0 otherwise	0.081	0.274	0	1
Retired	1 = the respondent is retired; 0 otherwise	0.290	0.454	0	1
Short education	1 = education up to high school diploma; 0 otherwise	0.565	0.496	0	1
Long education	1 = the respondent has at least bachelor's degree; 0 otherwise	0.151	0.358	0	1
Central Region	1 = the respondent lives in the Central Denmark Region; 0 otherwise	0.234	0.423	0	1
North Region	1 = the respondent lives in the North Region; 0 otherwise	0.096	0.295	0	1
South Region	1 = the respondent lives in the South Denmark Region; 0 otherwise	0.213	0.409	0	1
Zealand Region	1 = the respondent lives in the Zealand Region; 0 otherwise	0.156	0.362	0	1
Version	1 = the respondent has received the general-specific format survey; 0 otherwise	0.501	0.500	0	1
Telephone	1 = the respondent has answered the survey on the phone; 0 otherwise	0.031	0.173	0	1

Base categories: male, single, foreign national, unemployed, basic education, capital region. *N* = 1584 except for museum visits variable (*N* = 1534)

where LS_i is the life satisfaction score of individual i obtained from the survey responses; y_i is the income of individual i , typically specified in logarithmic form to account for a decreasing marginal effect of income on life satisfaction; Q_i denotes the level of consumption of the good under analysis; in the case of this study, it represents theatre attendance and museum visits (estimated separately). z_i is the vector of control variables that may impact the individual’s life satisfaction. In our application, we expect the partial derivative concerning Q to be positive, indicating that participation in theatre/museum activities improves individuals’ life satisfaction. Its contribution can be converted into monetary units through the Hicksian compensating surplus (CS), which indicates the change in income necessary to keep life satisfaction constant when there is a change of the provision of Q . Formally:

$$LS(y_0, Q_0, Z) = LS(y_1 - CS, Q_1, Z) \tag{2}$$

where the subscripts 0 and 1 denote respectively the conditions before and after the provision of the good Q . The equivalence (2) holds when there is a positive change of Q : for example, Q_0 may represent the absence of the public good, while Q_1 a positive provision of the public good.

When the natural logarithmic form of income is used, the CS can be obtained algebraically as follows:

$$CS = \bar{y} - \exp\left(\ln(\bar{y}) - \frac{\hat{\beta}_2}{\hat{\beta}_1} \cdot \Delta Q\right) \tag{3}$$

where \bar{y} is the average income in the sample, and ΔQ is the change in the level of consumption of the good under analysis.

When there is a negative change of the good (i.e. a welfare loss), the CS will be interpreted as the amount of money required to keep a randomly chosen individual just as satisfied with life even though there is a reduction (or absence) of the good. Formally:

$$LS(y_0, Q_0, Z) = LS(y_1 + CS, Q_1, Z) \tag{4}$$

In this case, the CS can be obtained algebraically as follows:

$$CS = \exp\left(\ln(\bar{y}) - \frac{\hat{\beta}_2}{\hat{\beta}_1} \cdot \Delta Q\right) - \bar{y} \tag{5}$$

4.2 Endogeneity issues

The estimation of the LSA equation is associated with serious problems such as endogeneity, omitted variables and simultaneity (Frey et al. 2010). First, income is a potential endogenous variable; it is plausible that individuals with “happy” personality traits are more productive and thus more likely to have a higher income (Clark et al. 2008).

To address this issues, we instrument the income variable using a predictor of the household income, following the intuition by Luttmer (2005) and then followed by Luechinger (2009), Pischke (2011), Vendrik (2013) and Kaiser (2020); although our construction of the variable slightly differ from them, their idea was to predict the labour earnings for a large set (around 5000) of occupation x industry combination cells, by regressing for each year the log annual labour income with a full set of industry and occupation dummies, and then taking the exponential of the fitted values of this regression for each member of the household to obtain the predicted household income. Our sample is smaller than the ones used in the previously mentioned studies.⁴ making it difficult to have a prediction for each industry x occupation combination based on our available observations. Therefore, we build our predicted household income by using the EUROSTAT data on labour earnings.⁵ Specifically, we have considered the average annual earning in Denmark for each combination of gender (2), NACE categories of the economic activities (21) and the first digit of the DISCO-08 occupation codes (10) to derive the predicted labour earning of each individual in the sample based on his/her industry/occupation.

We do the same for the other members of the respondents' household⁶ to obtain the predicted household income.

The idea of this instrument is that in this way the income reflects industry and occupation wide factors but not exceptional efforts by a member of the household. However, there main concern in using this instrumental variable is that respondents' occupation and industry can be endogenous to individual preference; it can be argued that some industries/occupations, even if they offer a lower wage, have a more pleasant work environment than others, impacting individual life satisfaction. To overcome this issue, we add to the life satisfaction equation industry and occupation dummies, as well as the reference income as described in Sect. 3.

A simultaneity issue can arise also in the relationship between cultural participation and the reported life satisfaction; individuals who participate in cultural activities may be more predisposed towards socialization and thus be happier regardless the cultural participation. In this case, the instrumental variables used are the score from 1 to 5 assigned to the following two statements in the survey: "*It is important that in Denmark we have a wide range of different types of professional theatre performances (museums and high-quality exhibitions)*" and "*It is important that theatres (museums) exist because they contribute to the general enlightenment and make us wiser about ourselves and others*". It is expected that the opinions on the importance of theatre/museums should be correlated with theatre participation and exogenous with respect the life satisfaction. Bille (2002) finds in a contingent valuation study on the Royal Danish Theatre that user-status is positive correlated with

⁴ These studies are based on large longitudinal panel dataset of national surveys of households, such as the German SOEP and the NSHF in USA.

⁵ https://ec.europa.eu/eurostat/databrowser/view/EARN_SES18_49/default/table?lang=en&category=labour.earn.earn_ses2018.earn_ses18_an.

⁶ The respondents' household members did not participate in the survey. However, using the respondents' civil number, we obtain information from Statistics Denmark concerning the gender and the industry/occupation codes of the respondents' members of the household.

Table 2 User-status and expression of values of theatres and museums

Agree or agree very much to the following statements	Have missed going during COVID-19	User within the last year (have not missed)	User more than a year ago	Non-user
It is important that we have a wide range of different types of professional theatre performance in Denmark	93%	72%	68%	36%
It is important that theatres exist because they contribute to the general enlightenment and make us wiser about ourselves and others	83%	59%	58%	31%
It is important that we have a wide range of museums and exhibitions of high quality in Denmark	97%	82%	72%	44%
It is important that museums exist because they contribute to the general enlightenment and make us wiser about ourselves and others	96%	85%	74%	41%

expression of non-use values in terms of the theatre's significance for the country's cultural level. Furthermore, the use of opinion and beliefs concerning the object under analysis as instrumental variable is common in the life satisfaction literature (among others, see, for example, Bruni and Stanca 2008; Ruseki et al. 2014; Wicker 2020). Table 2 shows the relationship between user-status and expression of values in our study (agree or agree very much to the statements).

4.3 LSA estimation

We present the estimation of Eq. (1) in Table 3, with the diverse specifications for the cultural participation variable. Although the life satisfaction variable is ordered, established literature on life satisfaction and subjective well-being (Ferrer-i-Carbonell and Frijters 2004; Frey et al. 2009; Powdthavee 2010) has shown that a cardinal measure can be adopted without effects on the final empirical results. Thus Eq. (1) has been estimated using the 2SLS rather than an ordered logit or probit with instrumental variables, facilitating the interpretation of the coefficients estimated.

Concerning our variables of interest, income is positive significant, as expected. Theatre attendance is significant (at 10% significance level) in both versions: *ceteris paribus*, being a theatregoer leads to an average increase of life satisfaction score by 0.579 points, while a positive discrete change of theatre attendance is associated with an average improvement of 0.196 points in the life satisfaction score. Museum visiting is, however, far from being a significant factor, indicating that this activity is not associated with an improvement in life satisfaction.

The difference between theatres and museums in terms of impact on life satisfaction is puzzling. There are only a few former studies to compare with. One of them is Bryson and MacKerron (2017) who find (in accordance with our results) that "theatre, dance, concert" was ranked before "exhibition, museum, library" in

their relevance to the reported happiness, among the 39 leisure activities considered in their study. Wheatley and Bickerton (2019) found a positive but not significant effect of frequency of museum visits on life satisfaction, while the effect is positive significant for frequency of arts activities and arts events. One can only speculate about possible explanations. Visiting a museum is a more common activity than theatre visits for the majority of the population. In 2019, the Danish museums had in total 15.6 mill. visits, compared to 2.8 visits to theatres. In other words, most Danish people visit a museum sometimes, where a visit to a theatre can be seen as a more special event. This seems to be confirmed looking at the descriptive statistics in Table 1; more people visited a museum at least once in the last 12 months than attended a theatre performance; however, the mean and standard deviation values of the continuous variable is larger in the case of theatre attendance. This suggests that, although there are fewer theatregoers than museum visitors, the former participate more than the latter. Furthermore, a ticket to a theatre is in general much more costly than a visit to a museum. A theatre ticket will in most cases cost at least 80 €, while a visit to a museum often is free of charge, or cost around 15 €. Thus, we can expect that a visit to a theatre is something which is a more deliberate add-on to the everyday life, and therefore have a higher impact on life satisfaction. Furthermore, attending a theatre performance may be part of a night out with friends or family, including a nice dinner and a drink after the performance, in total contributing significant to life satisfaction. On the other hand, museum visits can be seen as a more integrated part of the life for many people, and therefore, it is not seen as something special adding to life satisfaction.

Concerning the suitability of our instruments, for theatre models the statistical tests suggest that our instruments are relevant and satisfy the orthogonality condition, while the Wu-Hausman test rejects the null hypothesis that the OLS estimators are more efficient than the 2SLS ones, confirming the need for instruments. On the contrary, the test for exogeneity is not rejected in the museum models, and the instruments used are relevant but not valid, indicating that the opinions on the importance of museums are correlated with the error term of the life satisfaction equation.

In relation to this, Table 4 compares the income and cultural participation estimates obtained with OLS and 2SLS.

The significant impact of theatre participation is confirmed also in the OLS models, as well as the non-significant impact of museum visits. We can see also that the 2SLS models lead to an increase of the estimates for both the income and cultural participation variables. This affects the CS estimation, as will be discussed in Sect. 6.

Concerning the other socioeconomic variables, conforming to our expectations disability has a significantly negative impact on life satisfaction, leading *ceteris paribus* to an average decrease in the LS score of around one point. Also, having experienced a shock event in the previous 5 years leads to an average approximately 0.80-point decrease in the life satisfaction score. A statistically significant positive contribution to individuals' well-being comes from socialising (around 0.17 points on average), as well as from his/her civil status. Finally, the self-reported LS score seems to be affected by the ordering effect and by the way in which the survey has been submitted.

Table 3 Life satisfaction equation

	Theatre (dummy)	Theatre (continuous)	Museum (dummy)	Museum (continuous)
Ln income	1.208** (0.524)	1.271** (0.519)	0.896* (0.525)	0.976* (0.509)
Ln reference income	-0.416 (0.632)	-0.524 (0.630)	-0.231 (0.657)	-0.310 (0.654)
Theatre attendance	0.579* (0.340)	0.196* (0.115)		
Museum visit			0.297 (0.358)	0.107 (0.332)
Disability	-0.987*** (0.193)	-0.995*** (0.192)	-1.074*** (0.191)	-1.080*** (0.190)
Shock event	-0.839*** (0.129)	-0.842*** (0.129)	-0.826*** (0.129)	-0.834*** (0.130)
Social	0.170*** (0.052)	0.156*** (0.056)	0.186*** (0.050)	0.186*** (0.050)
Residential properties	-0.215 (0.163)	-0.211 (0.164)	-0.082 (0.171)	-0.099 (0.169)
Children	-0.042 (0.064)	-0.047 (0.064)	-0.057 (0.064)	-0.053 (0.064)
Age	0.010 (0.034)	0.015 (0.034)	0.008 (0.037)	0.011 (0.037)
Age-sq./100	-0.017 (0.032)	-0.022 (0.032)	-0.016 (0.034)	-0.019 (0.034)
Female	-0.080 (0.115)	-0.104 (0.118)	-0.061 (0.114)	-0.062 (0.115)
Widow	0.651** (0.286)	0.648** (0.287)	0.563** (0.287)	0.558* (0.287)
Divorced	0.370* (0.209)	0.418** (0.208)	0.227 (0.203)	0.225 (0.204)
Married	0.564*** (0.166)	0.594*** (0.167)	0.561*** (0.168)	0.553*** (0.168)
Danish	-0.068 (0.224)	0.018 (0.224)	0.009 (0.213)	0.017 (0.213)
Employed	0.040 (0.332)	0.063 (0.335)	0.225 (0.371)	0.170 (0.354)
Student	-0.040 (0.331)	0.057 (0.329)	0.047 (0.330)	0.050 (0.331)
Retired	0.273 (0.335)	0.298 (0.338)	0.466 (0.374)	0.411 (0.362)
Short education	-0.017 (0.131)	-0.044 (0.133)	0.044 (0.135)	0.053 (0.134)
Long education	-0.355 (0.221)	-0.390* (0.224)	-0.188 (0.229)	-0.199 (0.235)
Central region	0.063 (0.153)	0.068 (0.154)	-0.030 (0.147)	-0.022 (0.148)
North region	0.113 (0.205)	0.108 (0.205)	0.005 (0.213)	0.014 (0.218)

Table 3 (continued)

	Theatre (dummy)	Theatre (continuous)	Museum (dummy)	Museum (continuous)
South region	0.088 (0.159)	0.083 (0.159)	0.003 (0.164)	0.010 (0.168)
Zealand region	-0.000 (0.173)	-0.003 (0.173)	-0.087 (0.176)	-0.085 (0.180)
Version	0.168* (0.100)	0.187* (0.101)	0.175* (0.100)	0.176* (0.101)
Telephone	0.893*** (0.304)	0.859*** (0.302)	0.926*** (0.299)	0.916*** (0.299)
Constant	-2.803 (4.942)	-2.319 (4.952)	0.430 (4.874)	0.425 (4.894)
<i>2SLS Diagnostic test [p-value]</i>				
<i>F-test first stage</i>				
Ln household income	30.60 [0.000]	30.60 [0.000]	27.15 [0.000]	27.15 [0.000]
Theatre/Museum participation	56.48 [0.000]	38.27 [0.000]	50.35 [0.000]	57.98 [0.000]
Wu-Hausman test of exogeneity	3.526 [0.030]	3.376 [0.031]	1.736 [0.177]	2.571 [0.276]
Sargan-Hansen overidentification test	0.130 [0.718]	0.106 [0.745]	7.213 [0.007]	6.968 [0.007]
N° of observations	1584	1584	1534	1534
R ²	0.092	0.084	0.121	0.121

Robust standard errors in round parentheses. *** $p < 0.01$ ** $p < 0.05$ * $p < 0.10$. The 2SLS estimations include 21 industry and 10 occupation dummies

5 Life satisfaction during the COVID-19 period

In this section, we propose an extension of the life satisfaction model, taking into account the variation of the life satisfaction score over time (specifically before and during the COVID-19 pandemic) and how it relates to cultural consumers who suffered from lack of accessibility to theatres and museums.

Recent studies (Ammar et al. 2020; Gawrych et al. 2021) have confirmed that individual life satisfaction has significantly decreased during the COVID-19 pandemic. As shown in Fig. 1, in our survey, there is likewise evidence of a decrease in the life satisfaction score. This decrease is statistically significant (p -value < 0.001), as reported in Table 5.

The hypothesis is that, controlling for other time-variant factors (health, economic, mental and stress condition), the closure of theatres and museums during the lockdown period has led to a larger disutility (difference between the two life satisfaction scores) for cultural consumers (users) than non-cultural consumers (non-users). If confirmed, this additional disutility could be due to the temporary closure of theatres and museums.

5.1 Methodology

In our setting we consider the theatre closure,⁷ i.e. the lack of theatre accessibility, as a treatment that affects theatregoers (the treated group), assuming that non-theatregoers' (control group) life satisfaction is not affected by the temporary closure of theatres and so for them there is not a treatment as they are indifferent to this specific restriction.

We consider a theatregoer to be an individual who has attended at least one theatre performance in the previous 12 months.

To infer about the significance of the treatment and the other parameters, the following life satisfaction equation is estimated:

$$\Delta LS_i = \alpha + \delta D_i + \beta X_i + \gamma Z_i + \varepsilon_i \quad (6)$$

where the dependent variable ΔLS_i is the difference in the self-reported life satisfaction score between the two periods, δ is the treatment effect, D is a dummy equal to 1 if the individual belongs to the treatment group, X_i is a vector of socio and economic variables (the same used in estimating the previous LS models), Z_i denotes a vector of dummy variables related to the specific questions we asked about whether the pandemic has worsened/left unchanged/improved the respondent's life in relation to several dimensions, including physical health, job, income and stress (with the variable related to the unchanged situation set as base variable) and ε_{it} is the error term. Table 6 shows how these variables are distributed across our sample.

Among the socioeconomic variables included in X , we include the variable *social*, as already defined in the LS Eq. (1). The assumption is that, during the first wave of the pandemic, all the individuals were unable to meet with friends and family members (outside the household), so we can expect that *ceteris paribus* the more the people engaged in socialisation before the COVID, the larger the decrease in their life satisfaction. In this way, we disentangle the "loss of social activities" from the "loss of cultural activities" as effects of the lockdown measures.

The model is estimated separately for theatregoers and for museum visitors (Model 1 and 2). As we aim to provide a monetary measure of the possible loss of well-being by using formula (5), the income coefficient is incorporate in the model through a seemingly unrelated regressions (SUR) framework that considers the two LS Eqs. (1) and (6), with their error terms correlated.

In a second version of the model, we include in the treated group the individuals who answered "very much" to the question: *Have you missed the possibility of going to the theatre (of visiting a museum) during the Corona crisis?* (Model 3 and 4). In this case, we can suppose that these individuals are strong cultural consumers and the ones suffering most from the lack of physical accessibility to theatres and museums. This specification is justified by the fact that the closure of cultural institutions was considered as temporary; thus, it was not necessarily perceived as a fact that significantly affected the decrease in well-being.

⁷ The reasoning that follows can also be applied to museum visitors in relation to museum closure.

Table 4 Comparison of the estimates OLS vs. 2SLS

	Theatre (dummy)		Theatre (continuous)		Museum (dummy)		Museum (continuous)	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Ln income	0.260*** (0.093)	1.208** (0.524)	0.240*** (0.091)	1.271** (0.519)	0.264*** (0.093)	0.896* (0.525)	0.255*** (0.090)	0.976* (0.509)
Theatre attendance	0.161* (0.094)	0.579* (0.340)	0.044* (0.027)	0.196* (0.115)				
Museum visit					0.028 (0.097)	0.297 (0.358)	0.001 (0.040)	0.107 (0.332)
Socioeconomic control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses. *** $p < 0.01$ ** $p < 0.05$ * $p < 0.10$

Finally, we consider a version of the model that assumes the treatment is represented by a continuous variable, corresponding to a different intensity of the treatment. As continuous treatment variables, we use the number of theatre performances attended (Model 5) and museum visits (Model 6) during the previous 12 months, where both variables are constructed in the same way as in the estimation of the LS Eq. (1).

5.2 Empirical results

Table 7 reports the estimations of the LS Eq. (6), together with the income variable of the LS Eq. (1) obtained in the SUR model.

Focusing on the variables of direct interest for our study, the result of the Model 1 and 2 shows that theatregoers and museum visitors did not experience a significant fall in life satisfaction compared to non-cultural consumers, keeping fixed the other effects of the pandemic on personal life. However, we find a strongly significant decrease (at 1% level) for those people who miss attending theatre performances very much and/or museums (Model 3 and 4); these individuals, compared to others, report a larger decrease of life satisfaction of around 0.5 points. This is a subset of cultural consumers (17.73% of theatregoers and 14.96% of museum visitors) who have particularly suffered from the closure of theatres and museums. The other cultural consumers were not affected by this closure, probably because they were willing to postpone these activities once the lockdown restriction would be lifted.

Finally, the models with the continuous treatment (Model 5 and 6) show that the higher the museum visits before the pandemic, the larger the decrease in life satisfaction during the lockdown period (around 0.10 points for each increase of frequency, significant at 5% level), but this does not hold for theatre attendance.

Again, the difference we find between theatres and museums in Model 5 and 6 is interesting and deserves special attention, especially in relation to the results we found for the pre-Covid situation. There might be different explanations for this.

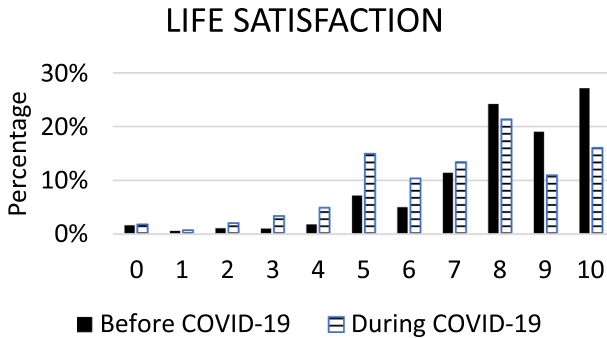


Fig. 1 Life satisfaction score before and during COVID-19 pandemic

Table 5 Life satisfaction descriptive statistics

	Mean	Std. dev	Std. error	Observations
Before COVID-19	7.9475	2.1163	0.0478	1963
During COVID-19	6.9613	2.3286	0.0526	1963
Difference	0.9862	2.3306	0.0526	1963

H_0 : mean (difference)=0 H_a : mean (diff.)>0 $t=18.7493$
 p -value=0.0000

Firstly, a hypothesis could be that theatre users were more likely to use cultural consumption at home as a coping mechanism during the pandemic lockdown. Movies, television and tv-series, as well as streaming services (such as Spotify, Netflix, Amazon) could partly have substituted real-life theatre performances (Tubadji 2020; Radermecker 2021; Ascolani et al. 2020). Many theatres and performing arts organizations adapted to the pandemic by offering online performances and streaming events, and theatre performances are broadcasted on tv and YouTube. While this is not the same as attending a live performance in person, it still allowed theatregoers to engage with their favourite art form and experience some of the emotional resonance and connection that comes with it. Museums visits are of another character, where the physical experience is difficult to substitute with an online experience.

Secondly, the short lockdown period (3 months) on which our study is based should be considered. While theatre users were probably willing to postpone their activities, and partly compensate by home-based activities, the heavy and dedicated users of museums have suffered a higher loss. One can only guess about the possible explanations for this discrepancy. As already mentioned, museums are generally visited by a larger share of the population than theatres, and museums might be seen as a more integrated part of life. However, when the possibility of museum visits was lost during the pandemic, the heavy users of the museums

Table 6 Proportion of the dummy variables used in the DiD model

	Improved	Unchanged	Deteriorated
Job situation	0.0235	0.8842	0.0924
Job security	0.0265	0.8647	0.1088
Financial situation	0.0300	0.8238	0.1463
Income security	0.0170	0.8382	0.1448
Physical health	0.0594	0.7459	0.1947
Mental state	0.0539	0.6890	0.2571
Stress level	0.1378	0.6515	0.2107

were more aware that museums were an important contribution to life. In other words, the discrepancy between the results of museum visits on life satisfaction in a normal (before COVID) situation, and during COVID, can be due to the “endowment effect” formalised in the prospect theory (Kahneman and Tversky 1979), where it is explained how people can value a loss higher than a gain. (In this situation, a loss in museum consumption has a higher impact on life satisfaction than the current use) In this way, the pandemic has forced people to reconsider what is important in life and to appreciate the things that they may have taken for granted in the past, such as museums.

Turning to the other life dimensions possibly affected during the lockdown period, the results indicate that the dimension of mental state has had the greatest impact on the change in individuals’ life satisfaction during the lockdown period, both positively and negatively, since these two coefficients scored are strongly significant and largest in absolute values. In particular, deterioration (improvement) in mental state during the first wave of the pandemic leads to an average decrease (increase) of around 1 (0.9) point in the self-assessed life satisfaction score. Looking at the other dimensions, we can see that it is mainly the worsening of physical health and stress level that have a significantly negative affect on the individuals’ well-being. The positive and statistically significant value of the variable related to social life confirms its importance as determinant of life satisfaction.

6 Consumer surplus: empirical results

In this section, we use the estimated coefficients of the LS Eqs. (1) and (6) to calculate the CS that cultural consumers attach to the cultural experience, in cases where the cultural participation variable is statistically significant, at least at 10% level. Table 8 reports the CS for a positive change in the provision of the cultural good, while Table 9 shows the CS for a negative change (the lack of accessibility to theatres and museums) The average annual household income of the sample is 37,188 € (276,675 DKK⁸) for the theatre models, and 37,239 € (276,675 DKK) for the museum models. The 95% confidence interval of the CS is obtained using the Delta method (Bliemer and Rose 2013).

⁸ Exchange rate: 1 € = 7.44 DKK (October 10, 2022).

The values in Table 8 can be interpreted as the annual reduction in household income necessary for theatregoers to retain a constant life satisfaction given the theatre accessibility (quantified as 14,171 €) or an increase in the number of theatre performances attended (quantified as 5318 € for each discrete increase).

The values in Table 9 represent the average amount of money required annually to keep a cultural consumer as satisfied with life as before the closure of theatres/museums during the lockdown (keeping all the rest constant). For theatregoers and museum visitors who greatly missed the opportunity, this compensation amounts to respectively 18,336 €, and 26,922 €. As to museum visitors in general, the average monetary value of the welfare loss for each missed museum visits (considering the scale used for the related categorical ordinal variable) is around 4425 €.

The differences between museums and theatres stands out, and the possible explanations follows from the discussion in Sects. 4 and 5. One further point can be noticed, namely that if cultural consumption at home had at least partially substituted live performances, the result could imply that the actual decrease in life satisfaction from pandemic closure for such people is even bigger than estimated (net of the specific estimation issues with the LS method), and that part of this loss has been partly compensated by extra cultural consumption at home (Tubadji 2020; Radermecker 2021; Ascolani et al. 2020). During the pandemic, people may have found other ways to connect with friends and loved ones, engage in hobbies or simply enjoy the beauty of the natural world. These sources of joy may have compensated for the absence of live theatre performances. However, as shown by Ateca-Amestoy (2011) and Ateca-Amestoy et al. (2016), cultural activities with social interaction are more likely to contribute to individual well-being than individual home-based activities.

What further stands out from the estimation is the excessively high estimates of the CS; this is a common criticism found in the LSA literature, for example, Clark and Oswald (2002) estimate the income compensation for moving from employment to unemployment to be approximately equal to 23,000 GBP per month. Similarly, the Ferreira and Moro (2010) estimation of the CS for an additional degree of temperature in January amounts to 15,585 €, and 5759 € for an improvement in the July temperature. Powdthavee (2008), in calculating the value of social interaction, derives a value of 85,000 GBP per year for moving from “seeing friends or relative less than once a month” to “seeing friends or relative on most days”.

The main reason for such overestimations is the fact that the LS equation tends to underestimate the effect of income on life satisfaction, as such an effect is “stripped out” by other control variables. The use of instrumental variables (when available) seems to be, at the moment, the most promising strategy to identify the real income effect, with the effect to increase the income coefficient, thus reducing the CS (as the income coefficient act as denominator). On the other hand, in our LS equation, the main variable of our interest (cultural participation) is also endogenous and thus has been instrumented, resulting in a higher increase of its coefficient, thus leading to an increase of the CS. As to the high estimates resulting from the lack of theatres

Table 7 Estimations

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Theatre closure	0.036 (0.099)		-0.481*** (0.173)		-0.007 (0.029)	
Museum closure		-0.039 (0.103)		-0.538*** (0.180)		-0.097** (0.042)
Social	-0.148*** (0.052)	-0.140*** (0.054)	-0.136*** (0.052)	0.132** (0.054)	-0.145*** (0.052)	-0.133** (0.054)
Job situation improved	0.048 (0.337)	0.154 (0.335)	0.044 (0.336)	0.177 (0.335)	0.053 (0.337)	0.149 (0.335)
Job situation deteriorated	-0.210 (0.219)	-0.316 (0.224)	-0.207 (0.219)	-0.294 (0.223)	-0.214 (0.219)	-0.325 (0.223)
Job security improved	0.469 (0.335)	0.597* (0.353)	0.451 (0.334)	0.570 (0.352)	0.467 (0.335)	0.575 (0.353)
Job security deteriorated	-0.337* (0.198)	-0.380* (0.204)	-0.347* (0.198)	-0.391* (0.203)	-0.334* (0.198)	-0.365* (0.203)
Income security improved	-0.469 (0.472)	0.026 (0.500)	-0.439 (0.470)	-0.033 (0.500)	-0.467 (0.472)	0.013 (0.500)
Income security deteriorated	-0.031 (0.200)	-0.092 (0.205)	-0.006 (0.199)	-0.100 (0.204)	-0.026 (0.200)	-0.098 (0.205)
Financial situation improved	-0.568* (0.312)	-0.739** (0.191)	-0.578* (0.311)	-0.709** (0.320)	-0.566* (0.312)	-0.722** (0.321)
Financial situation deteriorated	-0.541*** (0.186)	-0.366* (0.191)	-0.538*** (0.185)	-0.354* (0.190)	-0.540*** (0.186)	-0.362* (0.191)
Physical health improved	0.046 (0.212)	0.156 (0.219)	0.066 (0.211)	0.154 (0.219)	0.050 (0.212)	0.155 (0.219)
Physical health deteriorated	-0.530*** (0.128)	-0.569*** (0.130)	-0.510*** (0.128)	-0.584*** (0.130)	-0.531*** (0.128)	-0.572*** (0.130)
Mental state improved	0.817*** (0.233)	0.902*** (0.236)	0.822*** (0.233)	0.911*** (0.235)	0.819*** (0.233)	0.936*** (0.236)
Mental state deteriorated	-0.990*** (0.128)	-1.046*** (0.131)	-0.989*** (0.128)	-1.035*** (0.131)	-0.990*** (0.128)	-1.040*** (0.131)
Stress level improved	0.170 (0.149)	0.068 (0.155)	0.174 (0.149)	0.074 (0.154)	0.172 (0.149)	0.065 (0.154)
Stress level deteriorated	-0.494*** (0.135)	-0.437*** (0.137)	-0.481*** (0.135)	-0.433*** (0.136)	-0.491*** (0.135)	-0.437*** (0.137)
Socioeconomic variables	Yes	Yes	Yes	Yes	Yes	Yes
Income (LS equation)	1.063** (0.450)	0.741* (0.449)	1.199*** (0.438)	0.989** (0.436)	1.105** (0.444)	0.867** (0.434)
No of observations	1584	1534	1584	1534	1584	1534
R ² (LS Eq. (1))	0.140	0.140	0.140	0.140	0.140	0.140
R ² (LS Eq. (6))	0.167	0.158	0.170	0.161	0.167	0.158

Robust standard errors in parentheses. *** $p < 0.01$ ** $p < 0.05$ * $p < 0.10$

and museums accessibility, it should be noticed that the 95% C.I of the CS obtained include also 0 when the income and cultural participation coefficients are significant. This is due to the large standard error of the ratio between the two parameters,

Table 8 Consumer surplus for a positive change

	Being a theatregoer	Theatre performance
CS estimated	14,171 €	5318 €
95% C.I.	[- 3288 €; 31,631 €]	[- 2081 €; 12,718 €]

Table 9 Lost user value

	Miss theatre very much	Miss museum very much	Museum visit
CS estimated	18,336 €	26,922 €	4425 €
95% C.I.	[- 4059 €; 40,730 €]	[- 10,935 €; 64,780 €]	[- 1636 €; 10,487 €]

and it indicates uncertain on the real CS values. Furthermore, the timing of our survey has left little time for individuals to adapt in relation to the negative events associated with the pandemic; people presumably adapt to negative events as time goes by, so the negative effect of these events on life satisfaction will decline over time, and thus also the compensation surplus (Frijters et al. 2011).

The issue of high estimates of CS in LS studies leads to a discussion as to whether or not this approach can be comparable with the preference approach techniques to value policy outcome: the attraction of the LSA rests in having the concept of well-being (welfare or utility) at its heart, while other non-market valuation techniques are based on individuals' preferences. As such, we cannot expect them to provide the same monetary values; LSA monetises the actual change in people's utility when there is a change in the provision of the non-market good; the preference approach, on the other hand, derives the value (WTP) people attach to the non-market good from their statements or revealed behaviours, which are constrained by their income. Marsh and Bertranou (2012) discuss whether WTP can appropriately reflect the benefit of engaging with culture, posing the problem of incommensurability between some benefits and the notion of WTP; they argue that WTP can only partially reflect such benefits, while the concept of well-being (life satisfaction) can overcome this issue.

7 Discussion and conclusion

In this paper, we have investigated whether the worsening of individuals' well-being associated with the Covid-19 outbreak is more pronounced for theatre and museum consumers than for other individuals. In addition, we have provided a monetary value for such loss of utility. The monetary estimation seems too large, making the life satisfaction approach hardly comparable with the traditional preference-based methods for valuing non-market goods. This is a common criticism in the life satisfaction literature, and the main reason lies in the difficulty of assessing the impact of income on an individual's well-being. Despite this limitation, it is interesting to determine whether there is an impact exercised by cultural participation on

individuals' well-being, and how the impact differs both across type of institution (theatres and museums) and context (positive impact in normal conditions and negative impact due to their closure).

Attending performing arts events seems to contribute positively to life satisfaction, but visiting museums is not a significant determinant of life satisfaction. However, their closure during the lockdown has represented a welfare loss, and the greater the frequency of visiting museum, the greater this loss. One can only guess about the possible explanations for this discrepancy.

Firstly, the question is why attending performing arts events seems to contribute positively to life satisfaction, but visiting museums is not a significant determinant of life satisfaction. The results are partly supported by Bryson and MacKerron (2017) and Wheatkey and Bickerton (2019) who found that museum visits contribute less to the self-assessed happiness compared to other cultural activities. We propose that the explanation can be found in the fact that visiting museums is a more common activity than theatre visits for most of the population. Theatre visits are more expensive, and in that sense, a more deliberate add-on to the everyday life, and therefore, we assume its impact on life satisfaction is more significant. In that way, museum visits can be seen as a more integrated part of the life for many people, and maybe for this reason it is not perceived as something special adding to life satisfaction.

The second interesting question is why the greater the frequency of visiting museum, the greater the welfare loss, while this is not the case for theatres. The explanations might be twofold. Firstly, it is possible that the lack of accessibility to museums during the pandemic made their users more aware of the contribution of museum to life satisfaction (the "endowment effect"), which were taken for granted in the past. Secondly, there could be a substitution effect, where theatre performances perhaps were more easily substituted by cultural consumption at home, such as movies and tv-series. Many theatres and performing arts organizations adapted to the pandemic by offering online performances and streaming events. While this is not the same as attending a live performance in person, it could partly have substituted real-life theatre performances (Tubadji 2020; Radermecker 2021; Ascolani et al. 2020). On the other hand, we can suspect that such substitution effect between the physical and online experience is more difficult in the case of museums.

The difference between theatre and museums in terms of impact on life satisfaction is an important finding of this study. As there are only few former studies addressing the impact on cultural activities on life satisfaction, we find that much more research is needed, including qualitative research, to increase our understanding of the impact of cultural institution on life satisfaction and the differences between different types of cultural activity.

However, one unambiguous conclusion can be drawn from this study; as cultural participation improves individuals' well-being, the fact that cultural organisations were forced to close during the first wave of the pandemic has led *ceteris paribus* to a larger decline in life satisfaction among fervent cultural consumers than among other individuals. In the last years, the economic and political debate, with the OECD in the front line, has emphasized the need to consider measures of economic performance and societal progress that go beyond the GDP and focus on the society well-being. Consequently, policymakers should support actions addressed

to improve citizens' life. In this context, our results support cultural policies that increase cultural accessibility and participation as a mean to contribute to the society well-being.

The policy implications are, however, more nuanced than that. The impact on life satisfaction is just one among several cultural policy goals. While impact on life satisfaction can be interpreted along the lines of use-values, especially museums are expected to have high non-use values, as they are collecting and preserving the arts and cultural heritage for future generations (existence and bequest values) as well as doing research in their field of expertise. The non-use values and externalities represent an (the most) important argument for public subsidies to cultural institutions (Snowball 2008), and our study can in this respect be seen as one among other many other approaches to contribute to a better understanding of the values of arts and culture.

Author contributions All authors contribute to the study conception and design. TB has designed the survey. AB has performed the analysis and written the first draft of the manuscript. TB commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Funding This work was supported by Augustinus Fonden Grant 18-3999.

Declarations

Conflict of interest The authors report there are no competing interests to declare.

References

- Ammar A, Chtourou H, Boukhris O, Trabelsi K, Masmoudi L, Brach M, ECLB-COVID19 Consortium (2020) COVID-19 home confinement negatively impacts social participation and life satisfaction: a worldwide multicenter study. *Int J Environ Res Public Health* 17(17):6237
- Ascolani F, Cacovean C, Passaretti A, Portaluri T, Sacco PL, Uboldi S, Zbranca R (2020) Art consumption and well-being during the Covid-19 pandemic (research report)
- Ateca-Amestoy V (2011) Leisure and subjective well-being. In: *Handbook on the economics of leisure*, pp 52–76
- Ateca-Amestoy V, Gerstenblüth M, Mussio I, Rossi M (2016) How do cultural activities influence happiness? Investigating the relationship between self-reported well-being and leisure. *Estud Econ (mexico, DF)* 31(2):217–234
- Bakhshi H, Fujiwara D, Lawton R, Mourato S, Dolan P (2015) *Measuring economic value in cultural institutions*. Arts and Humanities Research Council, UK
- Bille Hansen T (1997) The willingness-to-pay for the Royal Theatre in Copenhagen as a public good. *J Cult Econ* 21(1):1–28
- Bille T (2002) A contingent valuation study of the Royal Theatre in Copenhagen. In: Navrud S, Ready R (eds) *Valuing cultural heritage. Applying environmental valuation techniques to historical buildings, monuments and artifacts*. Edward Elgar Publishing, pp 200–237
- Bliemer MC, Rose JM (2013) Confidence intervals of willingness-to-pay for random coefficient logit models. *Transp Res Part B Methodol* 58:199–214
- Brajsa-Zganec A, Merka's M, Šverko I (2011) Quality of life and leisure activities: how do leisure activities contribute to subjective well-being? *Soc Indic Res* 102(1):81–91
- Bruni L, Stanca L (2008) Watching alone: relational goods, television and happiness. *J Econ Behav Organ* 65(3–4):506–528
- Bryson A, MacKerron G (2017) Are you happy while you work? *Econ J* 127(599):106–125

- Clark AE, Oswald AJ (2002) A simple statistical method for measuring how life events affect happiness. *Int J Epidemiol* 31(6):1139–1144
- Clark AE, Frijters P, Shields MA (2008) Relative income, happiness, and utility: an explanation for the Easterlin paradox and other puzzles. *J Econ Lit* 46(1):95–144
- Crossick G, Kaszynska P (2016) Understanding the value of arts and culture: the AHRC cultural value project
- Dolan P, White MP (2007) How can measures of subjective well-being be used to inform public policy? *Perspect Psychol Sci* 2(1):71–85
- Ferrer-i-Carbonell A, Frijters P (2004) How important is methodology for the estimates of the determinants of happiness? *Econ J* 114(497):641–659
- Ferrer-i-Carbonell A (2005) Income and well-being: an empirical analysis of the comparison income effect. *J Public Econ* 89(5–6):997–1019
- Ferreira S, Moro M (2010) On the use of subjective well-being data for environmental valuation. *Environ Resour Econ* 46(3):249–273
- Frey BS, Luechinger S, Stutzer A (2009) The life satisfaction approach to valuing public goods: the case of terrorism. *Public Choice* 138(3):317–345
- Frey BS, Luechinger S, Stutzer A (2010) The life satisfaction approach to environmental valuation. *Annu Rev Resour Econ* 2(1):139–160
- Frey BS, Pommerehne WW (1989) *Muses and markets: explorations in the economics of the arts*. Blackwell
- Frijters P, Johnston DW, Shields MA (2011) Life satisfaction dynamics with quarterly life event data. *Scand J Econ* 113(1):190–211
- Fujiwara D, Kudrna L, Dolan P (2014) Quantifying and valuing the well-being impacts of culture and sport. Department for Culture Media and Sport Research Paper
- Fujiwara D, Lawton RN, Mourato S (2019) More than a good book: contingent valuation of public library services in England. *J Cult Econ* 43(4):639–666
- Gawrych M, Cichoń E, Kiejna A (2021) COVID-19 pandemic fear, life satisfaction and mental health at the initial stage of the pandemic in the largest cities in Poland. *Psychol Health Med* 26(1):107–113
- Grossi E, Blessi GT, Sacco PL, Buscema M (2012) The interaction between culture, health and psychological well-being: data mining from the Italian culture and well-being project. *J Happiness Stud* 13(1):129–148
- Hand C (2018) Do the arts make you happy? a quantile regression approach. *J Cult Econ* 42(2):271–286
- Hjorth-Andersen (2013) *Hvad koster kulturen?* Jurist- og Økonomiforbundets Forlag, Copenhagen
- Kahneman D, Tversky A (1979) Prospect theory: an analysis of decision under risk. *Econometrica* 47(2):263–291
- Kaiser C (2020) People do not adapt. New analyses of the dynamic effects of own and reference income on life satisfaction. *J Econ Behav Organ* 177:494–513
- Kaplan SA, Luchman JN, Mock L (2013) General and specific question sequence effects in satisfaction surveys: integrating directional and correlational effects. *J Happiness Stud* 14(5):1443–1458
- Luechinger S (2009) Valuing air quality using the life satisfaction approach. *Econ J* 119(536):482–515
- Luttmer EF (2005) Neighbors as negatives: relative earnings and well-being. *Q J Econ* 120(3):963–1002
- Marsh K, Bertranou E (2012) Can subjective well-being measures be used to value policy outcomes? the example of engagement in culture. *Cult Trends* 21(4):299–310
- Michalos AC, Kahlke PM (2010) Arts and the perceived quality of life in British Columbia. *Soc Indic Res* 96(1):1–39
- OECD (2013) *OECD guidelines on measuring subjective well-being*. OECD
- Powdthavee N (2008) Putting a price tag on friends, relatives, and neighbours: using surveys of life satisfaction to value social relationships. *J Socio-Econ* 37(4):1459–1480
- Powdthavee N (2010) How much does money really matter? estimating the causal effects of income on happiness. *Empir Econ* 39(1):77–92
- Pischke JS (2011) Money and happiness: evidence from the industry wage structure (No. w17056). National Bureau of Economic Research
- Radermecker ASV (2021) Art and culture in the COVID-19 era: for a consumer-oriented approach. *SN Bus Econ* 1(1):1–14
- Ruseski JE, Humphreys BR, Hallman K, Wicker P, Breuer C (2014) Sport participation and subjective well-being: instrumental variable results from German survey data. *J Phys Act Health* 11(2):396–403

- Snowball JD (2008) *Measuring the value of culture. Methods and examples in cultural economics.* Springer, Berlin, Heidelberg
- Tubadji A (2020) CULTURE: a tool for mental health resilience in COVID-19 times. *COVID Econ Vetted Real-Time Pap* 32(26):179–207
- Vendrik MC (2013) Adaptation, anticipation and social interaction in happiness: an integrated error-correction approach. *J Public Econ* 105:131–149
- Weinberg MK, Seton C, Cameron N (2018) The measurement of subjective well-being : item-order effects in the personal well-being index—adult. *J Happiness Stud* 19(1):315–332
- Wheatley D, Bickerton C (2019) Measuring changes in subjective wellbeing from engagement in the arts, culture and sport. *J Cult Econ* 43(3):421–442
- Wicker P (2020) The impact of participation frequency and travel distances for different sport participation purposes on subjective well-being: the 'unhappy commuter' and the happy sport tourist? *Eur Sport Manag Q* 20(3):385–402
- Wiśniewska A, Czajkowski M (2019) Designing a socially efficient cultural policy: the case of municipal theaters in Warsaw. *Int J Cult Policy* 25(4):445–457

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.