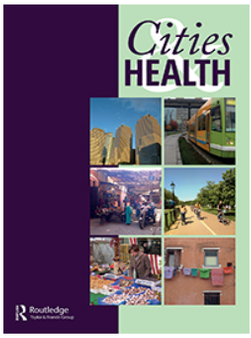

Cities & Health

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/rcah20

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To cite this article: Anna Pagani, Livia Fritz, Ralph Hansmann, Vincent Kaufmann & Claudia R. Binder (2021): How the first wave of COVID-19 in Switzerland affected residential preferences, Cities & Health, DOI: 10.1080/23748834.2021.1982231

To link to this article: https://doi.org/10.1080/23748834.2021.1982231

Published online: 04 Oct 2021.

CITIES & HEALTH
https://doi.org/10.1080/23748834.2021.1982231

Routledge
Taylor & Francis Group

ORIGINAL SCHOLARSHIP

How the first wave of COVID-19 in Switzerland affected residential preferences

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ABSTRACT

During the first wave of COVID-19, residents' health and well-being were challenged as residential environments suddenly had to accommodate most of the functions of an urban system. Although scholars and practitioners have proposed reconsidering dwelling requirements, their top-down approach overlooks the agency of residents whose preferences might have changed during the confinement. This paper investigates the effects of the first wave of COVID-19 on residential preferences in Switzerland. Adopting a systems perspective, we use an online survey of residents ($N = 5378$) to explore the extent to which the *functions* assigned to ideal dwellings have changed during the pandemic and relate these shifts to socio-demographic characteristics, changes in leisure activities, and respondents' environment conditions. Results indicate that at least one ideal function changed in importance for 60% of the respondents. The desire for a place for self-representation increased, whereas a place for meeting basic needs evinced the largest loss in importance. Our regression models enable us to identify two profiles of residents who responded differently to residential stress. We argue that housing owners, practitioners and policy-makers should empower inhabitants to respond to current and future challenges by acting on and changing their residential environment for their health and well-being.

ARTICLE HISTORY
Received 8 July 2021
Accepted 14 September 2021

KEYWORDS
System science; housing functions; residential health and well-being; logit models; residents' agency

Introduction

A healthy urban system enables people to perform all the functions of life and develop to their maximum potential (Hancock and Duhl 1986, Hancock 1993, Gatzweiler *et al.* 2017). During the first wave of the spread of COVID-19 in Switzerland, most of these functions were condensed into a single subsystem: housing. As of 16 March 2020, the Swiss Federal Council issued declarations urging the population to reduce social contacts and remain at home until further notice (Giachino *et al.* 2020, Swiss Federal Office of Public Health (SFOPH) 2020, Hansmann *et al.* 2021). In addition, measures were put in place that included the closing of all 'non-essential' services and work places, with the exception of companies where a physical presence was needed and social distancing was possible (Der Schweizerische Bundesrat 2020a, 2020b). As a consequence, most of the Swiss population found itself spending a considerable amount of time at home, which suddenly had to satisfy a large range of needs (Gwiazdzinski *et al.* 2020, Kaufmann 2021).

Previous studies have expressed concern for occupants' health – understood as physical, mental and social well-being (World Health Organization (WHO) 1946) – when activities typically situated outside the residential environment are transferred into it (Hartig and Lawrence 2003, Hartig *et al.* 2007). The confinement due to COVID-19 reinforced this concern by evincing that the lack of adequate space for work, study, exercise, and personal privacy at home can engender higher stress levels and eventually impact on residents' well-being (Amerio *et al.* 2020, Clair 2020, Tinson and Clair 2020, Hansmann *et al.* 2021). In response, practitioners and scholars have proposed to reconsider the requirements of residential buildings by predominantly focusing on dwelling features (e.g. room layouts, indoor air quality) that could solve the deficiencies revealed during the COVID-19 experience, e.g. lack of comfort, virus propagation, or increased energy usage (see Tokazhanov *et al.* 2020 for an overview). However, this linear top-down approach overlooks the complexity of the housing system and its dynamics, as it does not consider potential changes in residents' preferences during the confinement. Long advocated in the 'residential context of health' (Hartig and Lawrence 2003, Lawrence 2006, 2021b), and more recently in the context of the COVID-19 pandemic (Gatzweiler *et al.* 2020, Lawrence 2020, Rippon *et al.* 2020), a systems perspective recognizes people as agents of change *for* their health and well-being

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(Stokols 1992, Mitchell 2003, Lawrence 2004, Gatzweiler *et al.* 2017). As such, the study of the effects of COVID-19 on the housing system must account for its occupants' needs and desires (Pineo *et al.* 2018, Grigoriadou 2020).

Our paper aims to provide insights into the extent to which the first wave of COVID-19 affected residential preferences in Switzerland as a means to identify the 'adaptive' and 'life-enhancing' resources that must be made available in order to establish and maintain healthy residential environments (Stokols 1992). We adopt a systems perspective whereby the *function* of a system (i.e. what it is for) determines how the system behaves or manifests itself (i.e. what it does; Gero and Kannengiesser 2004, Meadows 2008). Previous work has demonstrated the co-existence of multiple *housing functions* in the housing realm, each of which shapes various human behaviours (i.e. residential preferences) and material behaviours (i.e. dwelling forms; e.g. 'suburban detached house'; Pagani and Binder 2021). Therefore, studying housing functions enables us to observe changes at a higher systems level and simultaneously account for trade-offs between and changes in dwelling, neighborhood or location features regardless of the societal and environmental supersystems influencing them (e.g. culture, geography; Rapoport 2000, Pagani *et al.* 2021a). Based on this framework, we analyze data from a survey of Swiss residents (N = 5378) and explore the relationships between shifts in the housing functions assigned to ideal dwellings and socio-demographic characteristics, changes in leisure activities, and the conditions of respondents' environments (physical, social, legal, economic).

The next section contextualises this research by providing a succinct overview of the specificities of the Swiss housing and health systems. The methods used for this study are then detailed, followed by the results of the statistical analyses. Before concluding, we put our findings in perspective, acknowledge their limitations and discuss their contributions to housing health research and practice, thereby paving the way for future investigations.

Housing and health in Switzerland

There is evidence that the interrelations between housing and health are shaped by several factors (e.g. meaning of housing, autonomy, tenure security, social policies), which vary between populations and across geopolitical levels (Hartig and Lawrence 2003, Lawrence 2012, 2021b). The Swiss housing and health systems present some unique features, the understanding of which is crucial when investigating the housing-related effects of the confinement due to COVID-19.

First and foremost, Switzerland exhibits the highest share of tenants among OECD countries (more than 60% against less than 28%; OECD 2019), a proportion that reaches above three fourth of the population in the urban cantons of Basel-Stadt (84%) and Geneva (78%; FSO 2019b). The rental housing market is dominated by the private sector, whereby the rules governing the tenancy of apartments most often permit little-to-no inhabitant participation in designing their residential environment (Rabinovich 2009). In addition, considering that a third of the population lives in buildings constructed before 1960, dwellings often mismatch with the requirements of increasingly diverse households (Hugentobler 2017, FSO 2019b, Lawrence 2021b). Finding appropriate housing where to relocate can be a challenging task, given that the Swiss housing market exhibits a lower than 'natural' vacancy rate (from a national average of 1.72% down to 0.63% in the agglomeration of Geneva; Zimmermann 1992, FSO 2019b). This housing shortage is exacerbated by high housing costs, which in 2009 potentially affected 25% of Swiss households in their ability to meet basic needs (Hugentobler 2017).

Despite these figures, the share of Swiss residents reporting satisfaction with the availability of 'good, affordable housing in their city or the area where they live' is higher than the average for OECD countries (55% versus 48%; Werczberger 1997, OECD 2019); more generally, life satisfaction in Switzerland scores 7.5 out of 10 points, which contributes to the country's high performance in the OECD Better Life Index (2021). In fact, people in Switzerland have a high life expectancy, supported by a high level of economic development and a responsive health system (OECD/WHO 2011, p. 11). The latter, however, comes at a price for its citizens; 'an exception to the norm in Europe', Switzerland does not offer neither a public health insurance scheme nor a national health service, but a regulated privatised system (Bonoli and Kato 2004, p. 218). Radically reformed in 1994, the system consists of health insurance funds (called *Krankenkassen* in German, or *caisses maladie* in French) which provide coverage for their members; all persons residing in Switzerland are compulsorily insured under the basic insurance scheme. The premiums are independent of the individuals' income, which can imply a disproportionate contribution from low and middle income people, reaching up to 20% of the available household income in certain cantons (Sax 2020). These disparities reveal the lack of a comprehensive and coherent national health policy, whereby the cantons have considerable room for manoeuvre in applying the federal legislation (Rossini 2020). Furthermore, the commitment of the Swiss Confederation and the cantons to social goals is intended to *complement* individual responsibility and private initiative, thereby giving important

responsibility to the individual when it comes to social risk (Studer 2020). This understanding of subsidiarity as '*Eigenverantwortung*' or '*responsabilité individuelle*' applies also to the housing sector (Glaser 2020), whereby a lack of a national or cantonal policy for the provision of social housing leaves the search for dwellings mostly to the people, depending on local programmes and options in the city (Hugentobler 2017).

The importance given to individual responsibility can also partly explain the large compliance of the Swiss population with the measures adopted during the first wave of COVID-19. While the Swiss consociational system was 'profoundly' altered to allow the Federal Council to overrule cantonal responsibilities and form immediate responses, the federal measures and recommendations strongly relied on national 'common sense' and voluntary adhesion. As a result, a compromise between lockdown and freedom was reached in form of a 'semi-confinement', with recommendations and measures aimed at limiting non-essential movements without obliging households to stay at home (Sager and Mavrot 2020, Clément et al., 2021).

Against this socio-political context, this article investigates whether, during the first 'lockdown light' in Switzerland, a change in residential preferences occurred. Considering the important role of socio-demographic variables in shaping the interrelationships between housing and health, potential changes are first explored in relation to the characteristics of the study participants. Subsequently, we examine these changes with regards to variations in leisure activities during the lockdown, which gives us the opportunity to explore the effects of and compliance with the Swiss Federal Council's measures and recommendations. Although the latter aimed to preserve citizens' agency, several structural factors may have hindered residents' ability to adapt housing in response to residential stress (e.g. tenure type, age of the building); we therefore consider the conditions of residents' environment during the pandemic (e.g. economic resources, housing comfort) as additional explanatory factors for the change in the kind of dwelling they considered as ideal.

Methods

Survey implementation

The survey was implemented with the goal to investigate the material and emotional experience of the lockdown as part of 'Swiss Corona Citizen Science', a transformative mixed methods study carried out by the École Polytechnique Fédérale de Lausanne (EPFL), University of Lausanne (UNIL), and the Idiap research institute.[1] Survey administration began three weeks after the introduction of measures (8 April 2020) and ended the day before most of the measures were terminated (10 May 2020; i.e. Phase 2 of re-opening; Giachino *et al.* 2020). The questionnaire was available online in the three official languages of Switzerland (German, French, Italian) and English, and was disseminated via several channels (e.g. university websites, social media, press release).

Questionnaire and study measures

The survey started with questions on the respondents' socio-demographic characteristics shortly before the confinement, including gender, age, professional status, household type, education level and tenure type.

To measure changes in residential preferences, participants were first asked about the kind of dwelling they considered as ideal before the COVID-19 pandemic, and then about the type they would choose if they were to move after the 'crisis' (i.e. post-pandemic). As possible answers, respondents were given the definitions of nine housing functions identified in previous research and asked to select a maximum of three (Table 1).

In addition, residents were asked which leisure activities they most enjoyed prior to the pandemic and which they have done since the beginning of the confinement; their choices encompassed 18 multiple answer options – for example, going to shows or movies. A set of 13 consecutive items was used to assess the conditions of respondents' environments (physical, social, legal, economic) during the confinement as measured via agreement with a set of statements (e.g. 'my accommodation lacks comfort', 'I lack economic resources') on a scale ranging from 1 = strongly disagree to 5 = strongly agree (0 = not concerned; set as missing).

Analysis

Statistical analyses were conducted using IBM SPSS Version 26. As the questionnaire asked for the selection of a minimum of 1 and maximum of 3 ideal functions, we filtered out cases in which zero or more than three

Table 1. Definitions of ideal housing functions provided to the respondents. Adapted from Pagani and Binder (2021).

Function	Definition
Security, privacy	A safe, intimate place
Self-representation	A place for expression, for satisfaction of aspirations
Status symbol	A 'showcase' of my status
Permanence	A place where I feel rooted
Commodity	A temporary place
Impermanence	A place that responds to my current needs
Production, consumption	A place that facilitates the performance of essential activities i.e. sleeping, eating, working
Property	A place that belongs to me
Shelter	My 'homely home'

options were selected, which resulted in a sample of $N = 5378$ out of the $N = 5932$ original respondents. We then computed descriptive statistics of the residents' socio-demographic characteristics, changes in their ideal functions and leisure activities during the confinement, and the conditions of their physical, social, economic and legal environments at the time of the survey.

To measure changes in each of the nine ideal functions i, we computed the variable $IF_{c,i}$ [−1 = loss in importance, 0 = unchanged, 1 = gain in importance]:

$$IF_{c,i} = IF_{p,i} - IF_{b,i} \quad (1)$$

where $IF_{p,i}$ and $IF_{b,i}$ indicate whether the function i describes the ideal dwelling post-pandemic and the one before the pandemic, respectively.

To observe the number of changes – i.e. loss or gain in importance – in the max. 3 selected ideal functions we computed IF_a [range: min. 0 to max. 6]:

$$IF_a = \sum_{i=1}^{9} |IF_{c,i}| \quad (2)$$

To explore concomitant changes in each leisure activity i, we computed $LA_{c,i}$ [−1 = loss in importance, 0 = unchanged, 1 = gain in importance]:

$$LA_{c,i} = LA_{p,i} - LA_{b,i} \quad (3)$$

where $LA_{b,i}$ indicates whether activity i was among the most enjoyable before the pandemic and $LA_{p,i}$ denotes whether activity i was actually performed during the confinement phase.

We used a McNemar's test on paired dichotomous data to assess whether changes in ideal functions and leisure activities were significant (i.e. $IF_{p,i}$ and $IF_{b,i}$; $LA_{p,i}$ and $LA_{b,i}$). The two ideal functions exhibiting the most relevant gain and loss in importance were selected to run binary logistic regressions. The ideal function for a post-pandemic dwelling $IF_{p,i}$ was set as a dependent variable, and four blocks of predictors were entered consecutively: (i) the ideal function before the pandemic $IF_{b,i}$ (1 item); (ii) the respondents' socio-demographic characteristics (6 items); (iii) changes in leisure activities $LA_{c,i}$ (18 items); and (iv) the assessment of respondents' environment conditions (13 items). Due to the lack of empirical evidence or theories about the most important explanatory variables for our model, we reduced the number of independent variables by using the Wald forward selection method (Bortz 1999), whereby entry and removal testing were based on the significance of the score statistic ($p < 0.05$) and the probability of the Wald statistic ($p < 0.1$), respectively.

Results

Respondents' characteristics

Table 2 displays the sociodemographic distribution of the respondents ($N = 5378$). Due to the channels used for participant recruitment, the sample is not representative of the Swiss population, as it exhibits a predominance of French-speaking respondents (90%) over the German-speakers (approx. 5%) compared with 23% and 62%, respectively, in national statistics (FSO 2019c, Hansmann et al., 2021). Female residents constituted the largest share of respondents (65%; about 15% more compared to Swiss population; FSO 2019e). Residents aged 25–54 years were overrepresented (68.3%) to the detriment of the 65+ age group (about 15% less than official figures; FSO 2019e). This distribution is reflected in the large proportion of employed (75.6%) and highly educated (i.e. tertiary education; 54.5%) respondents, whose frequency was at least 10% greater than in the Swiss population (FSO 2019d). In addition, most households were couples with (38.5%) and without children (26.9%) rather than one-person households (23.4%) – the most frequent household type in Switzerland (36%; FSO 2019a). However, the larger share of tenants (60%) over homeowners (36.7%) roughly reflects the distribution of tenure types in the Swiss housing market (FSO 2019b).

Table 2. Selected socio-demographic characteristics of the sample ($N = 5378$).

Category	Variable	N	%
Gender	Male	1872	35.1
	Female	3458	64.9
	Total	5330	100
Age	18–24	501	9.4
	25–34	1218	22.8
	35–44	1314	24.5
	45–54	1126	21.0
	55–64	738	13.8
	65–74	368	6.9
	75+	88	1.6
	Total	5353	100
Professional status	Employed	3902	75.6
	Student	413	8.0
	Unemployed	847	16.4
	Total	5162	100
Education level	Non-academic	2312	45.5
	Academic	2774	54.5
	Total	5086	100
Household type	Flatshare	260	5.3
	Couple with children	1877	38.5
	Couple without children	1311	26.9
	Monoparental family	281	5.8
	One-person household	1142	23.4
	Total	4871	100
Tenure type	Owner	1970	36.7
	With parents	27	0.5
	Other	148	2.8
	Tenant	3222	60.0
	Total	5367	100

Change in ideal functions

Overall, approx. 40% of the residents did not report any change in their ideal housing functions IF_a, whereas 60% of respondents indicated that at least one ideal function gained or lost in importance during the pandemic. Approximately one-third of the respondents reported two changes, i.e. substituted one ideal function with another, and about 13% noted three or four. Twenty respondents (0.4% of the sample), reported six changes, thereby identifying a totally new set of ideal functions.

Figure 1 shows the descriptives for the variables $IF_{c,i}$, where the functions, 'property', 'shelter' and 'impermanence' exhibit the largest oscillation in importance and therefore a certain stability with regard to their relevance for the overall sample. The functions 'property' (+13.5%), 'impermanence' (+7%), and 'self-representation' (+9.2%) evince the greatest gains in importance. In particular, the latter displays very small observed losses in importance (−3.3%), thereby resulting in the highest absolute gain (approx. 6%). Conversely, 'production, consumption' shows a relevant loss (−8%) and the smallest gain in importance (+4%).

Results of the McNemar's test indicate that there is a statistically significant difference in the functions considered to be ideal before the pandemic $IF_{b,i}$, and those reported as desirable for the post-pandemic $IF_{p,i}$, with the exception of 'status symbol', 'permanence' and 'impermanence', which evince similar gains and losses of importance (Figure 1).

Change in leisure activities

The descriptive analysis of variable $LA_{c,i}$ shows that during the first wave of COVID-19, residents predominantly gave up activities such as talking or having a drink with friends (70%) and going to shows (37%). Although not particularly favored prior to the pandemic, social media use (29%) and watching TV or online series (26%) were reported as the most performed activities since the beginning of the confinement. All differences in leisure activities are statistically significant except for 'engage in a creative activity', which was equally enjoyed before and performed during the confinement (Figure 2; McNemar's test).

Conditions of respondents' environments

Figure 3 illustrates the extent to which respondents agreed with a set of statements concerning the conditions of their physical, social, legal, and economic environments during the first wave of COVID-19. The predominant feeling was 'I miss my loved ones' (54% of respondents), followed by 'I lack interactions (virtual, face-to-face, etc.) and physical contacts' (38%). Also notable are boredom, excessive workload, and fear for one's health, with which around 20% of respondents rather or strongly agreed.

Regression analyses: 'self-representation' and 'production, consumption'

Tables 3 and 4 present the results of two binary logistic regressions in which the dependent variable is the function (i.e. 'self-representation' and 'production, consumption') selected (= 1) or not selected (= 0) as ideal for a post-pandemic dwelling.

The strongest determinant of the selection of 'self-representation' as ideal function for a post-pandemic dwelling was whether it was selected to describe the

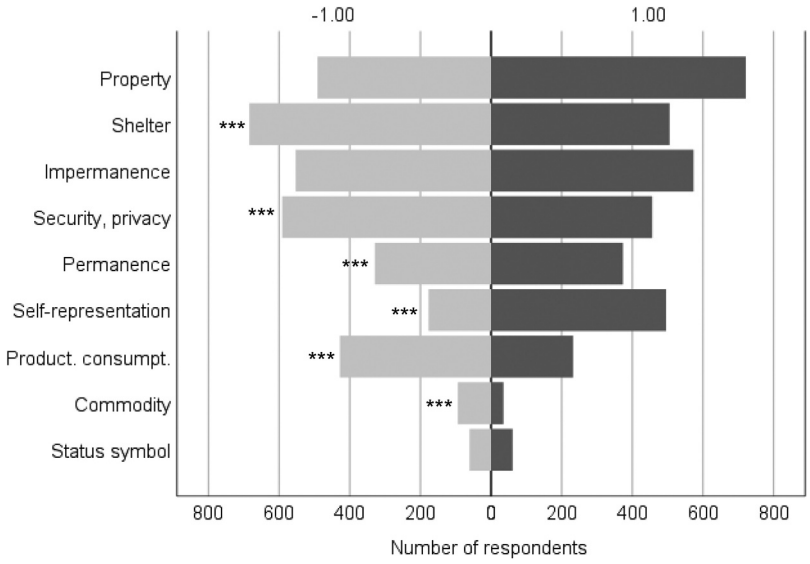

Figure 1. Housing functions considered to be ideal for a post-pandemic dwelling but not before (1.00) versus ideal before but not post-pandemic (−1.00) for the share of respondents for whom at least one function changed (n = 3142). Product. consumpt. = production, consumption. McNemar's test comparing ideal housing functions before and during the pandemic: *** $p < 0.001$.

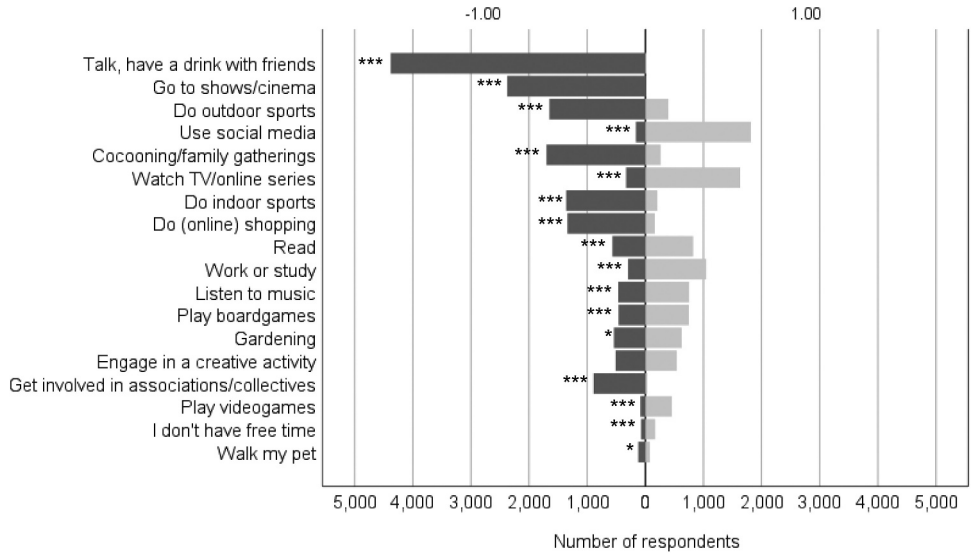

Figure 2. Leisure activities most performed during but not selected as preferred before the confinement (1.00) and most enjoyed prior to but not engaged in during the confinement (−1.00). Only the share of responses denoting that change occurred is displayed (n = 4118). McNemar's test comparing leisure activities before and during the confinement: *$p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

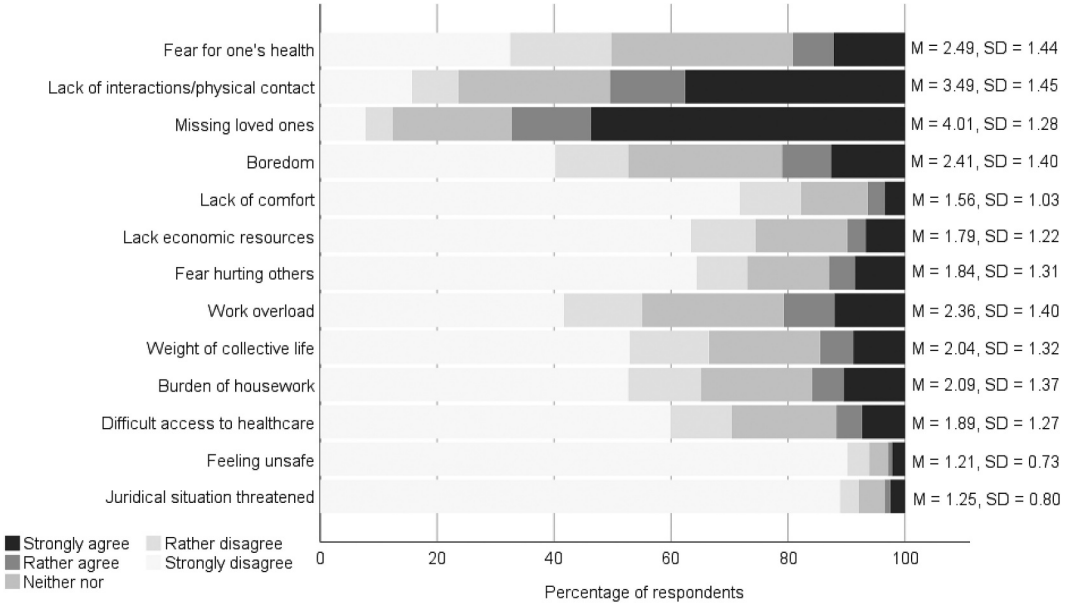

Figure 3. Assessment of respondents' environment conditions during the first wave of COVID-19. Share of respondents to whom a condition applies: n min = 3708, n max = 5056.

ideal dwelling before the confinement (OR = 23.91, CI = 17.26–33.13). Table 3 additionally indicates that male respondents were 27% less likely than females to consider such a place as their ideal dwelling to which to move after the pandemic (OR = 0.73, CI = 0.55–0.97). The same is true for residents without an academic degree compared with those with tertiary education (OR = 0.71, CI = 0.53–0.94). Residents who liked to go to the cinema or shows during their leisure time – and have not been able to do so since the confinement began – appear to be 31% more likely to desire a place for 'self-representation' for their post-pandemic dwelling, as increase in this activity exhibits the strongest negative association with selecting such a function (OR = 0.69, CI = 0.53–0.89). Among respondents' environment conditions, residing in an uncomfortable dwelling (OR = 1.28, CI = 1.14–1.44) increased the likelihood of considering this function to be ideal by a factor of 1.28; having to take on too much domestic or care work (e.g. children or other relatives; OR = 1.17, CI = 1.06–1.29) was also positively but less strongly associated with this desire, whilst missing the loved ones (OR = 0.89, CI = 0.81–0.99) evinced the opposite regression coefficient.

Table 4 indicates that the strongest determinant of the selection of 'production, consumption' as the ideal function for a post-pandemic dwelling was whether it

Table 3. Binary logistic regression analysis of predictors of deeming a place for 'self-representation' the ideal dwelling to which to move after the pandemic.

	B	SE	Wald	df	*p*	OR	95% CI
Ideal function before the pandemic							
Self-representation	3.17	0.166	364.27	1	0.000***	23.91	17.26–33.13
Socio-demographic characteristics							
Gender (*ref. cat.* Female)	−0.31	0.146	4.62	1	0.032*	0.73	0.55–0.97
Household type (*ref. cat.* One-person household)			14.60	4	0.006**		
Flatshare	−0.06	0.318	0.04	1	0.848	0.94	0.50–1.76
Couple with children	−0.37	0.208	3.18	1	0.074	0.69	0.46–1.04
Couple without children	0.26	0.206	1.62	1	0.203	1.30	0.87–1.95
Monoparental family	−0.16	0.306	0.26	1	0.612	0.86	0.47–1.56
Education level (*ref. cat.* academic)	−0.35	0.143	5.86	1	0.016*	0.71	0.53–0.94
Change in leisure activities							
Go to shows/cinema	−0.38	0.134	7.86	1	0.005**	0.69	0.53–0.89
Assessment of environment conditions							
Lack of comfort	0.24	0.060	16.92	1	0.000***	1.28	1.14–1.44
Burden of housework	0.16	0.051	9.63	1	0.002**	1.17	1.06–1.29
Missing loved ones	−0.11	0.051	4.92	1	0.027*	0.89	0.81–0.99
Constant	−2.30	0.297	59.63	1	0.000***	0.10	
N	2282						
−2 Log likelihood	1587						
Improvement	Chi^2 = 499.705, df = 11, *p* = 0.000***						
Nagelkerke R^2	0.328						
Cox & Snell R^2	0.197						
Classification accuracy	87.7%						

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; B Beta coefficients; SE Standard Error; OR Odds ratios; CI Confidence Interval for OR.

Table 4. Binary logistic regression of predictors of deeming place for 'production, consumption' the ideal dwelling to which to move after the pandemic.

	B	SE	Wald	df	*p*	OR	95% CI
Ideal function before the pandemic							
Production, consumption	3.38	0.150	511.63	1	0.000***	29.42	21.95–39.44
Socio-demographic characteristics							
Gender (*ref. cat.* Female)	0.37	0.148	6.23	1	0.013**	1.45	1.08–1.93
Household type (*ref. cat.* One-person household)			9.82	4	0.044*		
Flatshare	−0.70	0.316	4.88	1	0.027*	0.50	0.27–0.92
Couple with children	−0.24	0.206	1.36	1	0.243	0.79	0.53–1.18
Couple without children	−0.51	0.224	5.09	1	0.024*	0.60	0.39–0.94
Monoparental family	−0.79	0.361	4.83	1	0.028*	0.45	0.22–0.92
Tenure type (*ref. cat.* Tenant)			11.30	3	0.010**		
Owner	−0.24	0.161	2.29	1	0.130	0.78	0.57–1.07
With parents	0.95	1.834	0.27	1	0.605	2.58	0.07–93.95
Other	1.71	0.607	7.94	1	0.005**	5.54	1.68–18.21
Change in leisure activities							
Cocooning/family gatherings	0.25	0.143	3.00	1	0.083	1.28	0.97–1.69
I don't have free time	0.73	0.346	4.44	1	0.035*	2.07	1.05–4.08
Assessment of environment conditions							
Lack of interaction/physical contact	−0.15	0.050	8.62	1	0.003**	0.86	0.78–0.95
Constant	−2.19	0.255	74.14	1	0.000***	0.11	
N	2282						
−2 Log likelihood	1321						
Improvement	Chi^2 = 727.618, df = 12, *p* = 0.000***						
Nagelkerke R^2	0.461						
Cox & Snell R^2	0.273						
Classification accuracy	87.9%						

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; B Beta coefficients; SE Standard Error; OR Odds ratios; CI Confidence Interval for OR.

was selected to describe the ideal dwelling before the confinement (OR = 29.42, CI = 21.95–39.44). Furthermore, male respondents were 45% more likely to consider such a place the ideal dwelling to which to move after the pandemic (OR = 1.45, CI = 1.08–1.93). Residents living in a shared flat (OR = 0.50, CI = 0.27–0.92), in a couple without children (OR = 0.60, CI = 0.39–0.94), or in a monoparental family (OR = 0.45, CI = 0.22–0.92) were significantly less likely to have or develop this desire compared with one-person households. Tenure type exhibits the second strongest effect, as the odds of preferring

such a function post-pandemic were more than five times greater for residents living in 'other' living situations (i.e. temporary residence, e.g. hotels, hostels, hosted by someone) than for tenants (OR = 5.54, CI = 1.68–18.21). Lacking free time for leisure activities since the beginning of the confinement also increased the likelihood to prefer a place that 'facilitates the performance of essential activities' (i.e. production, consumption) by a factor of 2 (OR = 2.07, CI = 1.05–4.08; Table 1). On the opposite, respondents who reported lacking interactions and physical contact were less likely to consider such a place to be ideal (OR = 0.86, CI = 0.78–0.95).

Discussion

This paper investigated how the first wave of COVID-19 in Switzerland affected residential preferences. We adopted a systems perspective whereby we considered changes in the housing system's *functions* as proxies for its human and material behaviours – i.e. occupants' preferences and their material manifestation in terms of dwelling form, respectively. In the following sections, we put our results in perspective, discuss the study's limitations and contribution to research and practice, and outline potential pathways for future research.

Results in perspective

Descriptive analyses indicated that the housing functions attributed to an ideal pre- and post-pandemic dwelling did not differ for 40% of the respondents. This result suggests a certain stability of preferences, which might derive from a perception of the first wave as a temporary and 'exceptional' event and the expectation of a relatively speedy return to 'normal life' (Preece *et al.* 2020), but also from the 'light' lockdown measures, which allowed Swiss residents to leave their homes at any time for any activity (Clément et al., 2021). However, the same analysis revealed that social and outdoor activities, although not forbidden, were drastically reduced to comply with the recommendations of the Swiss Federal Council (Figure 2). In this exceptional setting, we observe that a change in ideal housing functions had occurred for the majority of the sample (60%), thereby corroborating previous studies that have shown how certain 'triggers' – e.g. a divorce, the birth of a child – can bring about a change in residential preferences (Brown and Moore 1970, Mulder and Hooimeijer 1999, Pagani and Binder 2021, Pagani *et al.* 2021b).

The most relevant change in ideal functions concerned the desire for a place of 'self-representation' and 'production, consumption'. These two functions can be associated with fundamentally different human needs, the former reflecting higher needs (i.e. self-actualization or fulfilment), whilst the latter relates to lower, physiological requirements (e.g. sleep, food; see Maslow 1948). The respective increase and decrease in the importance of these functions and needs can be explained as a manifestation of measures and recommendations to prevent the spread of COVID-19, whereby residential environments were tasked with simultaneously providing manifold services and functions of urban systems – i.e. to fulfill substantially more than basic needs. The observed dichotomy between the gain and loss in importance of higher and lower needs, respectively, is further accentuated by the results of the regression analyses, which evinced two distinct profiles of residents who responded differently to residential stress; on the one hand, a group that could be denoted as the 'trapped' showed a greater propensity to develop a desire for a place of 'self-expression' during the confinement. This group comprised predominantly female respondents, reporting a higher education degree, who enjoyed cultural activities prior to the first wave, and have been particularly negatively affected by the confinement (i.e. burden of housework, lack of comfort) but were less likely to miss their loved ones (unlike a large part of the survey respondents; Figure 3). This profile exacerbates the widely-reported conditions of women in Switzerland, who are daily confronted with reconciling work and family life (Bonoli and Kato 2004, Martin 2020, FSO 2021). On the other hand, the 'pragmatic' group encompassed predominantly male respondents, living alone, in temporary housing situations (e.g. hotels, hosted by someone), lacking free time (i.e. working, studying) and not signalling a lack of interactions or physical contact (again, unlike a large share of the surveyed residents; Figure 3); this group displayed a greater likelihood of developing a desire for a place fulfilling the basic housing function of 'production, consumption'.

Limitations

Some limitations to this research must be acknowledged. Firstly, the descriptive analyses showed that the sample was not representative – e.g. of older adults, whose preferences differ from less vulnerable residents and are critical to addressing the impact COVID-19 had on well-being (Hartt 2020, Brüchert *et al.* 2021), but also of differences across cantons, which have been shown to play a key role in the definition of housing and health policies (Glaser 2020, Rossini 2020). Moreover, the observed decrease in the desire for a place for 'sleeping, eating, working' evinces that in contrast to other studies (Cole *et al.* 2020, Jones and Grigsby-Toussaint 2020, Tinson and Clair 2020, Benfer *et al.* 2021), the survey did not exhaustively

capture the effects of the pandemic for situations of homelessness, overcrowding, and poor quality or insecure housing. Secondly, the survey depicts preferences during a clearly delimited time frame; on the one hand, the observed changes might look different at the present time – one year into the pandemic, on the other hand, independent measurement of pre-pandemic preferences are not available for comparison. Lastly, we point to the fact that our identification of the two profiles reflects an unintended polarization (men–women; pragmatic–trapped) and insufficiently depicts the plurality of respondents' lifeworlds.

Contributions to and recommendations for housing health

Scholars have long demonstrated that the relevance of housing for health extends far beyond having or not having housing (Marans 1976, Kahlmeier *et al.* 2001, Hartig and Lawrence 2003, Shaw 2004, Hoisington *et al.* 2019). Maintaining healthy environments during a confinement, when the values generated and functions provided by the city are condensed into our homes, means redefining the notion of basic need so as to provide access to more than four walls and a roof (UN-Habitat 2012). It requires reflecting upon what 'adaptive' and 'life-enhancing' resources are needed for occupants to respond to residential stress stemming from the lack of space for sleeping, eating and working to an increasingly relevant mismatch between the dwelling and one's image of the self (Hartig and Lawrence 2003, Peters and Halleran 2021); it also means responding to the strongly perceived lack of interactions and nostalgia for the loved ones (Figure 3), the desire to meet friends and go to shows or the cinema (Figure 2), i.e. sociocultural needs for which our dwellings are unprepared to provide alternatives.

In sum, during a confinement, healthy housing is expected to exhibit the same qualities as a healthy city, i.e. to be compatible with and enhance access to a wide variety of experiences, resources, contacts and interactions while also addressing the urgency to contain the virus spread (Marans 1976, Kahlmeier *et al.* 2001, Gwiazdzinski *et al.* 2020, Lawrence 2021b). Given that in the Swiss context several factors may prevent inhabitants from adapting their dwelling to environmental stresses (e.g. tenure type), it is the responsibility of architects, housing providers and policy makers to ensure that dwellings' design promotes and preserves the autonomy of households and individuals, i.e. their freedom to use residential space independently and to adjust it to mitigate change (Turner 1976, Blunt and Dowling 2006, Lawrence 2012). In practice, this task could be translated into the provision of shared but personal spaces in residential buildings, which, if made accessible via a room-rental system, would benefit both the 'trapped' (e.g. music rooms, libraries) and the 'pragmatic' resident profiles (e.g. extra room for teleworking, which tripled during the first wave in Europe; Kaufmann 2021). Promoting the adaptability of spaces to different spatio-temporal needs at the building scale would also be beneficial for the mitigation of conflicts that arise between the functions each household member desires for their dwelling (be they basic, e.g. adults' work, children's schooling, or self-expressive, e.g. leisure). In addition, designing private but visually interconnected external spaces such as balconies could address the need for safe interactions with the surrounding community (visual, auditory, e.g. from balcony to balcony, from street to balcony), while functioning as public stage for 'social expression' (see Grigoriadou 2020); ensuring access to this kind of supportive environment would be of paramount importance for the health and well-being of elderly people who live alone and are at risk of spatial and social isolation (Lawrence 2021b). Such propositions are in line with scenarios for the future of housing developed during the first wave of COVID-19 in Switzerland within the framework of two Citizen Think Tanks that involved a share of the survey residents (see Pagani *et al.* 2020, Fritz et al., 2021).

It becomes clear that, as has been argued since the 1970s, healthy cities – and residential environments – should allow for a high degree of public participation and control over the decisions affecting health and well-being (Marans 1976, Lawrence 2021b); in other words, if residents are asked by the Federal Constitution to be *responsible* for their residential conditions, they should be *empowered* to act upon and change their residential environment during any stage of its life cycle (e.g. design, operation; Arroyo *et al.* 2021). Such empowerment would be in line with the call for proactive rather than corrective approaches for the promotion of health and well-being (Lawrence 2004, 2019, 2021b, Gatzweiler *et al.* 2020). Furthermore, in light of the increasing attractiveness of the suburbs due to the failure of urban housing to meet residents' preferences during the confinement (Gwiazdzinski *et al.* 2020, Jones and Grigsby-Toussaint 2020, Kaufmann 2021), enhancing housing resilience could potentially counteract the negative consequences for climate and the environment entailed by the acceleration of urban sprawl.

Future research

From now on, homes will increasingly be expected to provide more than just the residential functions of urban systems (Jefferies *et al.* 2020, Tokazhanov *et al.* 2020, Kaufmann 2021); inhabitants will need to cope not only with the progression of the pandemic, but also with other complex societal challenges (e.g. the imminent threats of climate change) requiring coordinated system thinking and actions (Lawrence 2020). To support the formulation of a holistic response to these issues, we encourage scholars to build on the results of this study to consider other effects of the COVID-19 pandemic on the housing and

urban systems. For instance, a parallel study found the lack of housing comfort, together with sociodemographic variables such as sex, civil status, and professional status to be significant predictors of subjective psychological strain deriving from the confinement in Switzerland (Hansmann *et al.* 2021); investigating the link between subjective or objective health status and changes in preferences could lead to a clearer picture of which types of stress induce adaptations of residents' needs and desires and vice versa. To further explore the stability of residential preferences, another survey could aim at capturing the change in ideal functions during subsequent waves of COVID-19. Lastly, the approach adopted in this study could be used to investigate inhabitants' perceived shifts in urban systems' functions during the pandemic and thereby contribute to a better understanding of their changes (i.e. redistribution) in the housing subsystem.

Conclusion

This study illuminated that investigations of the pandemic effects on housing can benefit from a systems perspective whereby changes in residential preferences can be observed in relation to several elements of the housing system (i.e. occupants' characteristics, leisure activities, conditions of their environments). Our results contribute to ongoing reflections on ways to provide housing that guarantees inhabitants' health, understood as physical, mental and social well-being. We urge practitioners, housing owners and policy-makers to acknowledge the increasing need for housing as a place for self-representation and consider the added value of empowering inhabitants to respond to this design challenge.

Note

1. The mixed methods design is described in Fritz *et al.* (2021); a detailed description of the survey implementation is given in Hansmann *et al.* (2021). The project can be found at: https://www.coronacitizenscience.ch/

Acknowledgments

The authors would like to thank all the collaborators and participants of the "Swiss Corona Citizen Science" project. They especially acknowledge the anonymous reviewer for the constructive and valuable comments.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

The authors acknowledge funding through the Swiss Mobiliar Chair in Urban Ecology and Sustainable Living as well as the Swiss National Science Foundation (SNSF) within the framework of the National Research Programme "Sustainable Economy: resource-friendly, future-oriented, innovative" (NRP 73) under Grant [number 407340_172435].

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