Self-imposed social isolation among clients of social care organisations in the COVID-19 pandemic

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ABSTRACT

Although self-imposed social isolation is an important way of reducing the risk of COVID-19 infection, previous research indicates that this behaviour varies substantially between different groups and individuals. Socially marginalized people are generally less involved in protective health behaviours, but there are few studies of their COVID-19 protective behaviours. The aims of the paper are therefore to: 1) compare self-imposed social isolation to avoid COVID-19 among socially marginalized groups, and to 2) examine factors influencing this, focusing especially on the role of social capital, risk awareness and sources of information about COVID-19. The study is based on survey data (N = 173) from people who are clients of social care organisations in Estonia, Norway, Hungary and Portugal. The sample involves clients living: a) in their homes, b) in facilities, and c) on the street or under temporary arrangements. Results indicate that the level of social isolation among the marginalized groups is comparable to that of the general population in previous studies. As hypothesized, we find that respondents living on the street or under temporary arrangements engage in less self-imposed social isolation than e.g. the respondents living in their homes. We also find lower levels of risk awareness, social capital and trust in authorities' information about COVID-19 among people living on the street or under temporary arrangements. Only linking social capital and trust in authorities' information was significantly related to respondents' social isolation, and not worry for COVID-19 infection. Thus, it seems that respondents largely self-isolated because of "duty" and not worry for infection.

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1. Introduction

1.1. Background

The COVID-19 pandemic impacted public health severely across the globe. June 2022, there were over 543 million confirmed cases of infection globally and over six million deaths [1]. Since the outbreak of the pandemic various social distancing strategies were implemented by governments to limit the spread of the disease [2]. These social distancing strategies included e.g. temporary closing down of schools and workplaces as physical meeting places, prohibition of mass gatherings, restrictions on movement and instructions requiring people to minimize or avoid contact with people outside their residence [2]. These strategies were recommended based on their effectiveness in reducing individuals' risk of COVID-19 infection, and the infection rate in society [3].[1] Thus, social distancing is one of the most effective strategies individuals and societies can use to reduce the risk of COVID-19 infection. In the present paper, we focus on the strategy of self-imposed social isolation: avoiding contact with people outside your current residence.

Although self-imposed social isolation is an important way of reducing the risk of COVID-19 infection [3], previous research indicates that this behaviour varies substantially between different groups and individuals [4,5]. The factors influencing this in the general population include demographics (e.g. age, sex), the information sources about COVID-19 that are used, and risk awareness and attitudes to COVID-19 (cf. [5,6]).

Additionally, previous research indicates that some groups are generally less involved in protective health behaviours. This applies to various groups of socially marginalized people, such as people who experience homelessness, people who are poor, people with psychiatric disorders, alcohol or drug abuse disorders, minorities, undocumented immigrants, and asylum seekers [2,7–9]. Socially marginalized people in general and homeless people in specific are more likely to be more negatively affected by disasters in general and COVID-19 in specific, e.g. because of lower capacities to be personally prepared, less access to information and transportation, special medical and mental health needs, and lower trust in authorities [7,8]. People experiencing homelessness often lack the ability to respond to public recommendations before and during a disaster [7,8]. This might be due to or lower trust in authorities' information [7], sources of information available, and the interpretation of the available information being influenced by factors such as misperceptions or conspiracy theories [10].

The present study focuses on socially marginalized groups that are clients of social care organisations. The organisations range from soup kitchens providing meals and/or counselling facilities and institutions providing opportunities for long term accommodation. We divide the social service clients into people living: a) in their homes, b) in facilities, and c) on the street or under temporary arrangements.

Borgonovi and Andrieu [10] contend that adopting protective behaviour health behaviours requires the ability to acquire, interpret, act upon and share sound medical advice, and to filter between trustworthy scientific information, unfounded theories and dangerous and discredited news. Social capital is a key variable influencing peoples' access to, and interpretation of information about COVID-19, and hence their engagement in protective behaviours like social distancing and social isolation [10]. Social capital refers to networks, norms, values and trust that entities (individuals, groups, society) have available and which may offer resources for mutual advantage and support, and for facilitating coordination and cooperation in case of crisis and disasters (Morsuit & Kuran et al., 2020). Social capital is usually traced through three modal dimensions - bonding, bridging and linking [11]. Bonding capital refers to the extent and quality of close relationships with family and friends, bridging capital refer to relationships with diverse groups of people in our neighborhoods/community and linking capital refers to our relationships with authorities, more specifically our trust in authorities and key societal institutions.

The relevance of social capital for compliance with social distancing has also been indicated in studies combining objective mobility data and data on trust/social capital, or different proxies of social capital (e.g. voting, newspaper reading) in Italy [12,13], in Europe in general [14], in the US [15,16] and in Japan [17]. Few of these studies measure, however, the sub aspects of social capital (bonding, bridging, linking), explicating the analytical mechanisms through which social capital influence social distancing. In their study of COVID-19 and social isolation, Borgonovi and Andrieu [10] found that individuals who lived in US counties with high levels of social capital reduced their mobility faster than individuals living in US counties with low levels of social capital. They hypothesized that this is due to the mechanisms of social pressure (induced by bonding capital), risk awareness and trust in authorities' recommendations (induced by linking capital).

Socially marginalized groups have been found to have generally lower levels of social capital compared to the general population: they have fewer close relationships (bonding social capital), looser relationships with the different groups in their communities (linking social capital) and lower levels of trust in authorities (linking social capital) [18]. Among the three groups of social care organization clients included in the current study, we hypothesize based on previous research, that the people living on the street or under temporary arrangements have the lowest level of (bonding, bridging and linking) social capital (cf. [7,8], the lowest level of risk awareness, the lowest level of social pressure to socially isolate, and subsequently the lowest level of social isolation [10].

Despite the crucial importance of social capital in disasters, there are few studies examining the role of social capital in the COVID-19 pandemic, focusing on socially marginalized groups. Additionally, there are few or no studies on how socially marginalized groups cope with the COVID-19 pandemic in general (cf. [8]. Such knowledge is a precondition of increasing marginalized groups' capabilities to deal with COVID-19 in specific and disasters in general. The present study therefore provides an important contribution for future research and policy development.

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[1] Although they are known to have negative effects of mental well-being and mental health [2].

1.2. Aims

The aims of the paper are therefore to: 1) compare self-imposed social isolation to avoid COVID-19 among socially marginalized groups, and to 2) examine factors influencing this, focusing especially on the role of social capital, risk awareness and sources of information about COVID-19.

Referring to the respondents, we use the term socially marginalized rather than the term vulnerable, which also is used in the research literature. Some studies on vulnerable groups in crises point out that, too often, the identities of vulnerable groups are homogenized in practice without regard for the intersecting traits and continual factors that result in unequal disaster and environmental outcomes [19,38]. The term vulnerable might also connote with weakness and suggest that certain people have some intrinsic characteristic that make them vulnerable in crises. Socially marginalized refers to individuals' socio-economic status, which we operationalize based on the level of protection provided by living arrangements [20], separating between respondents living: a) in their homes, b) in facilities, and c) on the street or under temporary arrangements.

2. Previous research

2.1. Self-imposed social isolation to avoid COVID-19

Although there are no studies of self-imposed social isolation to avoid COVID-19 among socially marginalized groups, there are several studies focusing on the general population. These indicate relatively high levels of social isolation (e.g. approximately 60% in US and European studies). In a US survey, based on data from mid-March 2020 [4], about 40% of Americans were not complying with social distancing recommendations. In an Italian study, based on 2697 respondents from three waves of COVID-19, Briscese et al. [21] reported that between 63% and 70% of the respondents intended to maintain their self-isolation under different lockdown scenarios. Using survey data from a sample of 1.449 U S. residents collected in April 2020, Pedersen and Favero [5] conclude that their respondents generally indicated an intention to engage in strict social distancing. A Chinese conducted in March 2020 (N = 2130), reported 96% compliance with social distancing [6].

2.2. Factors influencing self-imposed social isolation to avoid COVID-19

2.2.1. Demographic variables

Several studies indicate that there may be demographic differences in intent to adhere to social distancing. First, women report higher levels of social distancing than men (Pedersen et a 2020; [6]). Second, Pedersen and Favero [5] find that older respondents (age 45 and older) indicate more social distancing, but that this difference may be mostly accounted for by differences in COVID-19 news attentiveness and COVID-19-related attitudes and beliefs. Canning et al. [22] also conclude that older people are having significantly fewer close contacts than younger people, which is in line with the public health authorities' recommendations.

2.2.2. The influence of information sources on COVID-19 protective behaviours

Referring e.g. to the research of Niepel et al. [23], Borgonovi and Andrieu [10] conclude that people who have accurate information are more likely to adopt health protective behaviors such as wearing a face mask in public, washing hands frequently, and avoiding unnecessary social contact. Previous research indicates that this is influenced by media consumption habits. For instance, Pedersen and Favero [5], find that those who primarily get their news from radio or social media in a US study report slightly less social distancing, while those who primarily get their news from websites tend to report more social distancing. Additionally, they report that those who claimed to follow news about COVID-19 more closely were more engaged in social distancing in this study.

2.2.3. Risk awareness and attitudes

Pedersen and Favero [5] concludes that the strongest predictors of social distancing behaviour generally are COVID-19-related attitudes and beliefs. Respondents who believe that COVID-19 is a monumental threat to society tend to socially distance more. In a study of personality traits, risk perception, and protective behaviors of Arab residents of Qatar during the COVID-19 pandemic, based on 405 respondents, Abdelrahman et al. [24] concludes that conscientiousness, neuroticism, risk perception, and personal hygiene practices predicted social distancing, with moderate effect sizes. Risk perception was measured as "how do you rate the danger of COVID-19 disease?" This study measured self-imposed social isolation, as staying at home and not go outside unless necessary, and 87.3% of participants reported that they preferred to do this.

2.2.4. Social capital

We may assume that the different aspects of social capital play different roles when it comes to peoples' experiences with the COVID-19 pandemic [42]. At the outset, we should assume that high levels of bonding and bridging social capital should be associated with higher levels of infections, as more social relationships are likely to produce more social interactions. We may refer to this as a negative analytical mechanism between social capital and COVID-19. Borgonovi and Andrieu [10] show, however, that the opposite is the case, as people with high levels of social capital are more likely to "bowl together by bowling alone", meaning that staying alone is an important way of "being social" in the COVID-19 pandemic. The key mechanism they use to explain this is that people with strong social ties are more likely to behave in accordance with governmental health advice because of **social pressure** and fear of stigmatization. This is the first positive mechanism that they suggest between social capital and social distancing. The second positive analytical mechanism that they coin is related to linking social capital, indicating that people with high levels of linking social capital have higher trust in authorities, and are more likely to follow authorities' recommendations, e.g. to socially isolate. The focus of this hypothesis is related to **risk awareness.**

2.2.5. Social capital and social marginalization

In a systematic review of the relationships between social capital and socioeconomic inequalities in health, Uphoff et al. [18] concludes that there is strong evidence to suggest that people with a lower socioeconomic status generally have lower levels of social capital, and that lack of social capital is related to socioeconomic inequalities in health. This conclusion is based on a review of 60 identified studies, and the authors conclude that it is supported by studies with various designs, sample sizes and settings. The bonding measure of friendship and the bridging measure of trust were most often associated with health measures in the reviewed studies, while linking social capital was the least likely component to be measured. One of the other key results of the review of Uphoff et al. [18], is that disadvantaged groups or people can be restricted in their opportunities to obtain and use social capital. Thus, socially marginalized groups have fewer close relationships (bonding social capital), looser relationships with the different groups in their communities (bridging social capital) and lower levels of trust in authorities (linking social capital). This especially applies to people experiencing homelessness (cf. [7,8,25].

2.3. Hypotheses

We have developed four hypotheses based on the abovementioned previous research. First, comparing the three groups of clients of social care organisations, we assume that people living on the street or under temporary arrangements will engage in less self-imposed social isolation (*Hypothesis 1*), as they are assumed to have lower levels of social capital than the two other groups (*Hypothesis 2*). We hypothesize that bonding social capital is positively related to social pressure to act in accordance with official guidelines to self-isolate (*Hypothesis 3*), and linking social capital is positively related to trust in authorities' recommendations to self-isolate during the pandemic (*Hypothesis 4*).

3. Method

3.1. Recruitment of respondents

The paper focuses on socially marginalized groups in four European countries (Hungary, Estonia, Norway and Portugal) Respondents were mainly recruited in the second half of 2020, and asked to rate their experiences with COVID-19 since March 2020. These four countries were chosen, as they had different levels of infection in the first period of the COVID-19 pandemic (March 2020–December 2020), and as they have different welfare levels. The highest average infection rate per 100.000 inhabitants per month were in Portugal (339) and Hungary (290), followed by Estonia (136) and Norway (75). All countries saw an increase in the last months of the year. Portugal had a generally higher infection level than the other countries throughout the year, but Hungary had high levels from September to December (cf. Appendix 1)

The current study was approved by the Norwegian Centre for Research Data, and similar institutions or research ethics committees in the other countries participating in the study. The studied groups are clients of the Salvation Army[2] or similar social care organisations, using services ranging from soup kitchens to homeless shelters and care facilities where people live for longer time periods.[3] Thus, the included respondents range from people living in their own homes to people living on the street or under temporary arrangements. Respondents were recruited when they visited the social care organisations. The interviews were conducted face-to-face, in calm and private areas within the institutions.

3.2. Survey themes

3.2.1. Background variables

The survey includes questions about sex, age, residence status (national citizen, asylum seeker, residing in the country without documentation etc.), whether respondents perceive that they represent a minority.

3.2.2. Living arrangements

We mainly focus on the level of protection provided by living arrangements as a source of social marginalization. In order to capture respondents' level of protection provided by living arrangements, we use the Framework for Understanding Homelessness on a Global Scale [20]. The framework allows to classify the people without accommodation, people living in temporary or crisis accommodation and people living in severely inadequate and/or insecure housing. We ask respondents: "Where have you been living and sleeping most of the time over the past year?", and we divide the answers on three alternatives: 1) My own home, 2) Centre/facility, 3) Street or temporarily arrangement. The category "Street or temporarily arrangement" is comprised of the alternatives: Street or other open space, Car, with friends or relatives on a temporary basis, Hotel, motel etc., Trailer or tent, Abandoned houses and homeless hostel. Centre/facility is comprised of: Rehabilitation centre (people with drug or alcohol problems, resocialization after prison), Facility for migrants. We also ask respondents about years living without home and years as a social care organisation client.

3.2.3. Psychological and physiological health

The survey asks: "Have you ever been told by a doctor that you have any of the following conditions?", providing 15 answer alternatives, represented by different physiological and psychological diagnoses. We have made two variables of these; one for each of them. Physiological diagnoses concern hearth and lung conditions (i.e. COVID-19 risk group), while psychological include schizophrenia, depression and personality disorder.

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[2] The Salvation Army is a project partner in the current project, but we have also cooperated with other social care organisations in the data collection process.

[3] (see Ref. [37] for an analysis of the factors influencing the resilience of the care organisations that the clients use, in the early phase of the COVID-19 pandemic).

3.2.4. Social isolation

Respondents were asked: "Have you taken any of the following actions repeatedly during the pandemic period, in order to avoid getting the virus?" "Avoided contact with people from outside my current residence". Answer alternatives ranged from 1 (totally disagree) to 5 (totally agree).

3.2.5. Social capital

We measure bonding social capital with the following questions, based on Lin et al. [26]: "The following question concerns the support you receive from other private people" (i.e. friends, family, colleagues, not people in organisations, like Salvation Army). "I experience a lot of understanding and security from others", "I know a very close person whose help I can always count on", "I know several people with whom I like to do things". We measure bridging social capital with the following questions, based on Buckner et al. [27]: The following question concerns your feelings about the people in the area where you live. "I regularly stop and talk with people in the area where I live", "I feel like I belong to the area where I live", "I am very attached to the local environment and landscape in the area where I live". We measure linking social capital with the following questions, adapted from the ESS core: "I can trust police", "I can trust social workers". Answer alternatives ranged from 1 (totally disagree) to 5 (totally agree) for all the statements.

3.2.6. Risk awareness

We measure risk awareness by means of four statements. The first three statements were introduced with the following sentence: "Please indicate your agreement with the following statements about actions to avoid the virus (e.g. avoiding contact with people, washing yourself more often)": "I haven't thought about such actions", "I don't believe the virus causes me notable harm", and "My life conditions do not allow me to do such things". The fourth statement measuring risk awareness was: "Since March 2020, I have been afraid of being infected with COVID-19". The survey also included: "I trust the information that the government of this country provides on the ways of avoiding COVID-19 infection." Answer alternatives ranged from 1 (totally disagree) to 5 (totally agree) for all statements.

3.2.7. Information sources

Respondents were asked: "What have been the two most important sources of information for you on the pandemic? Please, name two sources." Respondents could choose between 12 answer alternatives, e.g. television, newspaper, social media, friends, their own observations, police, social workers.

3.3. Analyses

When comparing the mean scores of different groups, we use one-way Anova tests, which compare whether the mean scores are equal (the null hypothesis) or (significantly) different. We use Chi square tests to compare groups' scores on particular variables, if we, for instance, cannot compare means due to the variables' level of measurement. The chi square test tests whether the actual distribution of groups on a variable is statistically significantly different from a coincidental distribution, or an independent normally distributed sample.

We use hierarchical, linear regression analyses, where independent variables are included in successive steps to assess the conditions explaining variation in the respondents' answers to two key variables: "Avoided contact with people from outside my current residence" and "I trust the information that the government of this country provides on the ways of avoiding COVID-19 infection". The most basic independent variables are included first, e.g. age, sex, living arrangements. Then the other independent variables are included. The regression analyses enable us to examine the separate effects of the independent variables on the dependent variables, controlled for the other variables. Of course, we cannot conclude about causality, as this is a cross-sectional and correlational study. We nevertheless use the term predict when we describe the regression analyses.

Given the relatively small sample and the explorative nature of our study, we think it is reasonable to not use a strict 5% significance level in our statistical analyses. In the analyses, we therefore report significance levels of both 5% and 10%. This applies both in our bivariate and multivariate analyses. Additionally, given the small sample we generally focus more on general patterns in the data than strict hypothesis testing focusing on significance levels.

4. Results

4.1. Description of the sample

In Table 1, we show respondents' answers to the question: "Where have you been living and sleeping most of the time over the past year?", for respondents from different countries, including the share of female respondents in each country.

It is important to note that Table 1 shows that the sample size differs in each of the four countries that we have recruited respondents from, ranging from 61 respondents in Estonia to 28 respondents in Norway. Additionally, the distribution of people living under different living arrangements is also different in the countries that we have recruited respondents from (cf. Table 1). For these reasons, we do not compare countries in the present study, but rather different categories of socially marginalized groups across the four countries.

The duration of stays in centre/facility may also be temporary, indicating that the main line of demarcation is between people living in their own homes and the two other groups, which we may refer to as different types and degrees of homelessness. Thus, although the distribution of living arrangements differs among countries, people living in their homes make up considerable shares in three of the countries, while people living on the street or under temporary arrangements make up considerable shares in all the four

Table 1

Respondents' answers to the question: "Where have you been living and sleeping most of the time over the past year?", distributed over four categories, distributed according to country, including the share of female respondents in each country.

	Home	Facility/Centre	Street and temporary	Other	Total	Share of females
Estonia	15%	43%	36%	7%	61	25%
Hungary	0%	0%	100%	0%	32	48%
Norway	57%	14%	29%	0%	28	43%
Portugal	40%	6%	48%	6%	52	19%
Total	27%	19%	50%	4%	100%	31%
Total	46	33	87	7	173	54

countries. The two groups that do not live in their homes have in general been clients of social care organisations for longer periods than people living in their own home. The average years as a client of social care organisations is 2.2 for people living in their homes, 4.5 for people living in facilities and 4.4 years for people living on the street or under temporary arrangements. Comparing years living without your own home, this was 5.8 years for people living in facilities and 5.1 years for people living on the street or under temporary arrangements. The share of females is highest among respondents living in their homes (46%), followed by those living in centres/facilities (32%) and lowest among those living on the street or under temporary arrangements (24%).

Half of the respondents are between 40 and 60 years old, and people living in a Facility/centre are generally older, with 78% above 50 years old. Corresponding shares for street or temporary arrangements and home are 60% and 47%. Thus, we see that respondents living in their own homes are generally younger, and with 46% females.

We also asked respondents about their residence status: 73% report that they are "national citizens" in the country in which they have been sampled, 17% report that they are "immigrant with residence permit", 1% reported to be asylum seekers, 3% reported to be "residing in the country without documentation", and finally 7% did not answer this question. Comparing living arrangements, 32% of people living in their homes were immigrant/asylum seeker/without documentation, while corresponding shares were for 23% for centre/facility and 13% for living on the street or under temporary arrangements.

We also asked respondents "Would you consider yourself part of a minority (e.g. cultural, ethnic, health/disability related, sexual orientation)?". A share of 12% answered yes (14% of those living in their homes, 4% in Centre/facility and 13% of those living on the street or under temporary arrangements.)

Respondents were also asked about psychological and physiological diseases. Comparing living arrangements, 15% among respondents living in their homes, or in facilities/centres reported psychological diagnoses, compared to 26% of the people living on the street or under temporary arrangements. Physiological diagnoses concern different hearth and lung conditions. Here 45% of the people in the facilities/centres answered yes, while 34% of people living on the street or under temporary arrangements and 22% of the people living in their homes answered yes.

4.2. Bivariate analyses

4.2.1. Social isolation, risk awareness and trust in authorities

In Table 2 we show results for variables measuring social isolation, risk awareness, information sources and trust in authorities (cf. section 3.2).

Table 2 indicates lower levels of social isolation among people living on the street and under temporary arrangements, while people living in their own homes report the highest level of social isolation. Furthermore, people living on the street and under temporarily conditions score higher on the statement: "My life conditions do not allow me to do such things", and "I haven't thought about such actions". People living on the street and temporarily also score slightly higher on the statement "I don't believe the virus causes me notable harm", and lower on the statement about being afraid of infection, but these differences are minor. People living in their homes have the highest level of risk awareness. Finally, we also see that people living on the street or under

Table 2

Mean scores and standard deviations for social isolation, risk awareness and trust in the three studied groups.

	Home		Facility/Centre		Street & temp.		
Social isolation:	M	SD	M	SD	M	SD	P
Avoided contact with people outside my residence	3.8	0.6	3.5	1.6	3.3	1.3	0.032
Risk awareness I:							
Actions to avoid the virus (e.g. social isolation):							
1) I haven't thought about such actions	2.7	1.2	2.3	1.3	3.0	1.1	0.012
2) I don't believe the virus causes me notable harm	2.8	1.1	2.7	1.4	3.0	1.2	0.415
3) My life conditions don't allow such actions	2.5	0.8	2.5	1.1	3.1	1.1	0.001
Risk awareness II:							
I am afraid of being infected with COVID-19	3.2	1.5	2.8	1.4	2.7	1.4	0.214
Trust in authorities:							
I trust government information about COVID-19	3.7	1.0	3.9	1.3	3.3	1.2	0.018

Note: Answer alternatives ranged from 1 (totally disagree) to 5 (totally agree) for all statements.

temporary arrangements have lower trust in the information that the government provides on the ways of avoiding COVID-19 infection.

4.2.2. Social capital among the studied groups

In Table 3 we show the mean scores of the bonding, bridging and linking social capital in the three studied groups, and correlations between the variables measuring social isolation, risk awareness and trust in authorities.

Table 3 indicates lower levels of bonding social capital among people living on the street or under temporary arrangements and among people living in facilities, compared with respondents living in their homes. The results also indicate lower levels of bridging social capital and linking social capital among people living on the street and under temporary arrangements, but these differences are smaller.

4.2.3. Information sources

The survey asks about the most prevalent sources of information about COVID-19 used by the respondents in three studied groups. The four most prevalent sources are: television (48%), social media (28%), newspapers (17%) and social workers (16%). Chi-square analyses indicate that the differences between the groups' shares for information sources are not statistically significant. It can nevertheless be mentioned that respondents in facility/centre have the highest share of television (55%) and newspaper (27%), people living in their homes have a higher share of social media (35%), while people living on the street or under temporary arrangements has the highest share of social/medical workers (18%) as their most important source of information.

Two-tailed Pearson's tests of significance indicate that use of television as information source on the pandemic is positively related to social isolation, worry of infection and trust in government. Social media, on the other hand, is negatively related to worry of infection. Thus, we see opposite effects of television and social media on worry of infection. The other sources of information were not significantly correlated to any of the variables measuring social isolation, risk awareness or trust in authorities' information about COVID-19.

4.3. Multivariate analyses

4.3.1. Factors influencing avoidance of contact with people from outside your residence

In Table 4, we show results for multivariate analyses of factors influencing avoidance of contact with people from outside one's current residence. The variables in the analyses are included based on hypotheses and based on factors that we find it important to control for in the analyses, e.g. sex, age and national exposure to COVID-19 (Portugal). Before conducting the multivariate analyses, we ran correlations and excluded some unrelated variables from the multivariate analyses. These analyses indicate that only linking social capital was correlated with social isolation (cf. Table 3). We also examined relationships with the dependent variables, and other potentially important variables, e.g. physical diseases which could indicate that the respondents might be in a risk group (e.g. lung and heart diseases), psychological diseases (e.g. depression, personality disorder). None of these were significantly correlated with social isolation. Neither was the variable "I don't believe the virus will cause me notable harm". Worry about COVID-19 virus infection was significantly correlated with social isolation, and it included in Table 4. We also include "My life conditions do not allow for such things" (e.g. social isolation), as people living on the street or under temporary arrangements scores higher on this, and as it is important to control for it when studying factors influencing social isolation.

Table 3
Mean scores of the bonding, bridging and linking social capital in the three studied groups.

	Home		Facility/Centre		Street & temp.			Correlations			
Capital	M	SD	M	SD	M	SD	p	Isolat.	Harm	Afraid	Trust
Bonding	11.3	2.6	9.8	3.7	10	2.9	0.032	n.s.	n.s.	.138*	n.s.
Bridging	10.8	2.3	11	2.5	10	3	0.106	n.s.	n.s.	.13*	n.s.
Linking	7.7	1.4	7.9	2.1	7.4	1.9	0.415	.28***	−.29***	.19**	.32***

*p < 0.1, **p < 0.05, ***p < 0.01.

Table 4
Linear regression predicting self-imposed social distancing. Standardized beta coefficients.

Variables	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7	Step 8	Step 9
Sex	−.148	−.157*	−.198**	−.177*	−.170*	−.127	−.157*	−.146	−.139
Age		.070	.128	.132	.121	.028	.017	.016	.011
Portugal			.200**	.172*	.168*	.126	.118	.096	.089
Street/temporary (=2)				−.125	−.131	−.090	−.069	−.070	−.097
Self-assessed health					−.084	−.090	−.124	−.121	−.105
Linking social capital						.267***	.193**	.184**	.199**
Trust government information							.363***	.345***	.367***
Worry about COVID-19								−.146	.079
Life conditions don't allow									.120
Adjusted R²	.013	.009	.037	.043	.042	.097	.219	.216	.221

*p < 0.1, **p < 0.05, ***p < 0.01.

First, the most important variable contributing to respondents' social isolation in Table 4 is trust the in government information, which is positively related to the dependent variable, indicating that high level of trust in government information about how to avoid COVID-19 is related to higher levels of social isolation.

The second most important variable influencing social isolation is linking social capital, which reflects trust in the police and social workers. Linking social capital is also related to trust in government information about how to avoid COVID-19, as the contribution of linking social capital is reduced when trust in government is included in Step 7.

Third, we see that sex contributes negatively in the first steps, indicating that male respondents are less inclined to be involved in social isolation than female respondents. Sex ceases to contribute significantly in Step 8, when worry and life conditions are included, probably because our data indicates that sex is related to worry: women worry more about COVID-19 infection.

Fourth, national exposure to COVID-19, (Portugal, which has had the highest level of infection among the included countries) has some influence in the first step, but this is no longer the case when including linking social capital and trust in government information. This indicates a relationship between high country exposure to COVID-19 and linking social capital in the data.

It is interesting to see that neither worry about COVID-19 infection, nor life conditions that impede e.g. social isolation contributes significantly to social isolation when we control for the other variables in the model.

Finally, the adjusted R^2 value in Step 9 indicates that the included independent variables explain 22% of the variation in self-reported social isolation.

4.3.2. Factors influencing trust in government information about how to avoid COVID-19

In the analyses in Table 4 above, we saw that trust in government information about how to avoid COVID-19 was the most important factor influencing respondents' following action to avoid the COVID-19 virus: "Avoided contact with people from outside my current residence". In Table 5, we therefore show results for multivariate analyses of factors influencing respondents' trust in government information about how to avoid COVID-19.

First, we see that the variable with the strongest contribution to the dependent variable is years at school. The negative contribution of this variable indicates that the more years at school the respondents have, the less trust they have in the information that the government provides on the ways of avoiding COVID-19 infection.

Second, the variable "Immigrant/asylum seeker/without permit" contributes positively, indicating that people who are immigrant, asylum seekers, or living without permit in the country trust COVID-19 information from the government more than people who are national citizens, controlled for the other variables in the model.

Third, the variable linking social capital contributes positively. This means that respondents who score higher on the linking social capital index trust COVID-19 information from the government more than people who score lower. This is not surprising, as linking social capital measures respondents' trust in the police and social support workers.

Fourth, we see that age (i.e. over 60 years) contributes positively to trust in authorities' COVID-19 information. This means that respondents who are over 60 years score higher on the dependent variables, controlled for the other independent variables in the model.

Fifth, the variable living on the street and under temporary arrangements contributes negatively in Step 3–5. The negative relationship indicates that respondents living on the street and under temporary arrangements have lover trust in governments' COVID-19 information than respondents living in their homes and in facilities. Living on the street and under temporary arrangements ceases, however, to contribute significantly when immigrant/asylum seeker/without permit is included. This indicates that these two variables are correlated, as the share of national citizens (with lower trust) is higher among people living on the street or under temporary arrangements.

Finally, the adjusted R^2 value in Step 8 indicates that the included independent variables explain 17% of the variation in the dependent variable.

Table 5

Linear regression. Dependent variable: «I trust the information that the government of this country provides on the ways of avoiding COVID-19 infection».

Variables	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7	Step 8
Sex	−.038	−.050	−.015	−.018	−.017	−.019	−.083	−.083
Age >60 = 2 (<60 = 1)		.164*	.161*	.131	.124	.115	.159*	.159*
Street/temporary (=2)			−.182**	−.162*	−.157*	−.122	−.099	−.099
Linking social capital				.172**	.162*	.175**	.195**	.195**
Television as source (=2)					.077	.100	.065	.065
Immigrant/asylum seeker/without permit (=2)						.186**	.228***	.229***
Years at school							−.318***	−.318***
Minority (=2, other = 1)								−.002
Adjusted R^2	−.006	.013	.038	.060	.059	.085	.176	.169

*p < 0.1, **p < 0.05, ***p < 0.01.

5. Discussion

5.1. Self-imposed social isolation to avoid COVID-19 among marginalized groups

The aims of the paper were to: 1) compare self-imposed social isolation to avoid COVID-19 among socially marginalized groups, and to 2) examine factors influencing this, focusing especially on the role of social capital, risk awareness and sources of information about COVID-19. To our knowledge, there are no studies of self-imposed social isolation to avoid COVID-19 among socially marginalized groups, and thus our study contributes with new knowledge on what seems to be a relatively under researched group. There are, however, studies examining social distancing and influencing factors in the general population in the first wave of the COVID-19 virus, and these generally indicate relatively high levels (e.g. 60–70%) of self-isolation under COVID-19 conditions e.g. in the EU and the US [4,5,21], and well over 90% in other political contexts, e.g. in China [6]. Comparing these results from previous research with the sample in the present study, we saw that 62% of the respondents in our study agreed with the statement that they have "avoided contact with people from outside my current residence" (since April 2020). Thus, our results indicate that the level of social isolation among our respondents is comparable to that of other studies focusing on the general population in the EU and US [4,5,21].

It should also be mentioned that one methodological challenge with several of the existing previous studies (e.g. Ref. [4] is that they are based on respondents' assessments of hypothetical future situations (assessed in March 2020), and not their actual behaviour. It might also be difficult to compare with several of the previous studies, as they focus on larger sets of social distancing strategies (e.g. Ref. [4]. Additionally, the sociopolitical contexts may differ in different countries. It may therefore be difficult to compare adherence to social distancing rules and recommendations in our studied European countries with results from e.g. China [6]. Additionally, the different levels of COVID-19 infection in the studied societies might also influence the support for and compliance with social distancing rules. Some of the studies also focus on compliance with national social distancing regulations, and these may differ based on the mentioned factors. Such regulations also differ across countries. Nevertheless, it is interesting to see that the level of social isolation among the marginalized groups in our study is comparable to the general population in a range of different countries. This is an important finding.

We developed four hypotheses based on previous research. The first hypothesis of our study was that people living on the street or under temporary arrangements will engage in less self-imposed social isolation than e.g. the respondents living in their homes (Hypothesis 1) (cf. [18]. Our results support this hypothesis. A share of 73% of respondents living in their homes agreed in the statement that they have "avoided contact with people from outside my current residence" (since April 2020), while 59% of respondents living in facilities and 59% of respondents living on the street or under temporary arrangements agreed (P < 0.001). We have not identified previous research presenting results for self-imposed social isolation among socially marginalized groups in general, or homeless in specific, and our results therefore provide important information about the level of infection control behaviours among such groups. As we have not identified directly relevant previous research, our hypotheses about differences between the groups are based on previous research about the mechanisms behind self-imposed social isolation. We discuss these in detail in the following.

5.2. Factors influencing self-imposed social isolation to avoid COVID-19

5.2.1. The influence of social capital

The basis for *Hypothesis 1*; that people living on the street or under temporary arrangements will engage in less self-imposed social isolation, was an assumption that this group would have lower levels of social capital than the two other groups *(Hypothesis 2)* [18]. Our results largely support this hypothesis: we find lower levels of bonding, bridging and linking social capital among people living on the street and under temporary arrangements. It is, however, only the difference between the scores for bonding social capital which is statistically significant (p = 0.032. Given the relatively small sample, it is however, important to focus on general patterns in the material and not only significance levels. This hypothesis was based on the research of Uphoff et al [18], who concludes, based on a systematic literature review, that there is strong evidence to suggest that people with a lower socioeconomic status generally have lower levels of social capital, and that lack of social capital is related to socioeconomic inequalities in health. (cf. [7,8,25]. Based on this, we expected that the more socially disadvantaged people are, the lower is their level of social capital, and thus that people experiencing homelessness have lower levels of social capital than marginalized people living in their homes We have seen that our results generally support this hypothesis. This could also be viewed as a restricted range problem, meaning that it may be difficult to test our hypotheses about this when we do not include other groups (from the general population) with supposedly higher levels of social capital.

Our third hypothesis was that bonding social capital are positively related to strong social pressure to act in accordance with official guidelines to self-isolate (*Hypothesis 3*). This hypothesis was based on the research of Borgonovi and Andrieu [10]. Our results do, however, not support this "social pressure" hypothesis, as we did not find a relationship between bonding social capital and self-imposed self-isolation. Although we do find significantly higher levels of bonding social capital among people living in their homes, and higher levels of self-imposed social isolation among people living in their homes, our bivariate correlation analyses do not indicate a relationship between these two variables, and thus only linking capital was included in the multivariate regression analysis. Finally, it should also be noted that the hypothesis based on Borgonovi and Andrieu [10] could go both ways: in a social environment which is negative to social distancing rules, high levels of bonding capital could also involve social pressure to not comply with such rules. Social capital may both facilitate and impede protective health behaviours. This is an important issue for future research.

The fourth hypothesis was that high levels of linking social capital are related to higher trust in authorities' recommendations to self-isolate during the pandemic *(Hypothesis 4)*. This hypothesis was also based on the research of Borgonovi and Andrieu [10], and our results support it. This is also in line with the results of Bargain et al. [14] and Durante et al. [12], who find relationships between the trust level in society and self-isolation. Our multivariate analyses indicated that the most important variable contributing to re-

spondents' social isolation was the variable "I trust the information that the government of this country provides on the ways of avoiding COVID-19 infection". Additionally, we found that the second most important variable influencing social isolation was linking social capital. This is not surprising, as this variable measures respondents' trust in the police and social workers.

According to Wu [6], the existing studies of COVID-19 have largely overlooked that different aspects of social capital play different roles when it comes to peoples' experiences with the COVID-19 pandemic as they largely fail to be explicit about how they are conceptualizing social capital, and thus obscuring the differential roles that different forms of social capital may play related to COVID-19. The main strength of the present study is that we measure and examine the importance of different types of social capital for the protective behaviours. Complicating these issues further, some studies also show that different types of social capital may be important in different phases of disasters. Yamaguchi et al. [28] study how different aspects of social capital influenced individuals' health and well-being after the Great East Japan Earthquake of 2011. This study reports that the level of linking capital may be important *during* disasters, as peoples' (dis)trust in authorities influence how they respond to recommendations and information from authorities during disasters. The study also reports that bonding capital may be important *after* disasters, as people seek comfort from their family and friends in ways that can reduce negative psychological impacts. This is an interesting topic for future research.

5.2.2. The influence of risk awareness

Previous research indicates a relationship between risk awareness, or attitudes towards COVID-19 and self-imposed social isolation. Abdelrahman et al. [24] concludes that people who rate the danger of COVID-19 disease as high are more likely to stay at home and not go outside unless necessary. Additionally, Pedersen and Favero [5] concludes that the strongest predictors of social distancing behaviour generally are COVID-19-related attitudes and beliefs. In the present study, we measure risk awareness as: "Since March 2020, I have been afraid of being infected with COVID-19". Contrary to the mentioned previous research, we do however not find a significant relationship between risk awareness and self-imposed social isolation. We do, however, see a lower but not statistically significant different score among respondents who live on the street or under temporary arrangements compared with respondents living in their homes, when it comes to worry about being infected with COVID-19: the former score 2.7 points and the latter 3.2. Thus, we see a higher level of risk awareness among the people who have the highest level of social isolation, i.e. the respondents living in their homes, although this is not significantly correlated with self-isolation in the multivariate regression analyses. Confer Nero et al. [39], for a comprehensive discussion of factors underlying risk awareness in general and COVID-19 skepticism in specific).

5.2.3. The influence of information sources

The most prevalent source of information about COVID-19 among our respondents was television, followed by social media, newspapers and social workers. In our bivariate analyses, we found that television as information source on the pandemic was related to more social isolation, worry of infection and trust in government information on COVID-19. Social media, on the other hand, was related to less worry of infection. Thus, we saw opposite effects of television and social media on worry of infection. Previous research indicates that different types of information sources influence social distancing in different ways. Pedersen and Favero [5] find, for instance that those who primarily get their news from radio or social media tend to report slightly less social distancing, while those who primarily get their news from websites tend to report more social distancing. Guo et al. [6] report that social media was a significant predictor of social distancing after controlling for other individual and environmental factors. The variation in these results indicate that the importance of the different information sources on correct health protection behaviours may vary according to the national context. This is an important issue for future research.

5.2.4. The influence of life conditions

In the present study we compare self-imposed social isolation among groups that we may expect to have different possibilities to isolate themselves from other people. We measured this through the question: "Avoided contact with people from outside my current residence". We measure living arrangements through the question: Where have you been living and sleeping most of the time over the past year? We divide respondents into people living: 1) In their homes, 2) In facilities and 3) On the street or under temporary arrangements. Respondents "living on the street or under temporary arrangements", includes only 16 people who answer "Street or other open space" for the last year, while the remaining 71 respondents in this category provide answers that we have labelled "temporary arrangements", e.g. homeless hostel, with friends or relatives on a temporary basis, hotel, motel etc., trailer or tent, abandoned houses. It is relevant to ask how someone living on the street or under temporary arrangements can take measures to avoid contact with people from outside their residence. The concept of residence refers to a place where people live or regularly stay, as compared to other temporary arrangements. People living on the street or under temporary arrangements are defined by the fact that they lack a regular residence to stay in, and thus how should they then define people "outside their residence"? To deal with this, we asked about "current residence" in the question about social isolation in the survey, taking into account that the living places of several of the respondents might be temporary. Nevertheless, for the 16 respondents living on the "Street or other open space", it may be hard to define the physical limits of their residence. In this case, we may note that the question about social isolation was interpreted to mean to avoid direct physical contact with other people in general, although you live on the street. This interpretation was confirmed by survey interviewer, who commented that even when there is no permanent physical residence, there still is a feeling of a place and people (i.e. "physical/social residence") where people living on the street may feel they belong in a specific place, and may spend time with specific people there. It was mentioned that social isolation is relevant for people living on the street too, as it shows if they changed their behaviour and tried to keep more isolated from those they are not that much together with daily (or nightly). For the other people living under the different temporary arrangements, we may assume that "Avoided contact with people from outside my current residence", means to avoid contact with e.g. people outside their homeless hostel, other people than the friends or relatives

they live with on a temporary basis etc. In this case, their situation is relatively similar to the respondents living in facilities (which implemented strict social distancing rules).

We may expect people living in their homes to have better possibilities to avoid contact with people outside their residence, than people living on the street and under temporary arrangements and people living in facilities. The former can isolate themselves physically within their homes. This is why we included the following statement in the survey: "My life conditions do not allow me to do such things" (e.g. self-isolation, washing etc. to protect myself from COVID-19 infection). As expected, the respondents living on the street or under temporary arrangements agreed more with the statement than people living in their homes. In the multivariate analyses, we saw however that the variable "My life conditions do not allow me to do such things" was not significantly related to self-imposed social isolation, while trust in authorities' COVID-19 information was. This indicates that trust in authorities' information is a more important predictor of self-isolation. Trust was also a more important predictor of social isolation than living arrangements (i.e. living in your own home). To conclude, it seems that it is possible to compare self-imposed isolation across individuals representing different types of living arrangements, although their types and extent of self-isolation may vary.

5.2.5. The influence of demographic variables

Previous research indicates that demographic factors (e.g. sex and age) predict intent to adhere to social distancing [5,6,22]. In accordance with this, we find that male respondents are less inclined to be involved in social isolation than female respondents. Sex ceased, however, to contribute significantly when worry about COVID-19 was included, as women worry more about COVID-19 infection. (Cf. Olson et al. [41] for a discussion of the impacts of COVID-19 for marginalized women). In contrast to Pedersen and Favero [5], and Canning et al. [22] we did not find higher levels of social isolation among older respondents. The age variable does not contribute significantly in the final model in the multivariate regression analyses. However, age contributes significantly to social distancing until linking social capital and trust in governments' COVID-19 information are included, indicating a relationship between age and trust in authorities' and their information about COVID-19. This is in line with previous (e.g. [29–32]. We expand on this below.

5.3. Trust in authorities' information about COVID-19

The most important variable contributing to respondents' self-imposed social isolation was the variable "I trust the information that the government of this country provides on the ways of avoiding COVID-19 infection". This is in line with previous research, indicating the importance of trust in authorities (i.e. linking capital) for self-imposed social isolation (cf. [10,12–17]. The unique contribution of our study is, however that we measure both linking capital and this specific question about the hypothesized mechanism linking social capital and self-imposed social isolation. Additionally, we examine the factors influencing the latter. An important backdrop of the study was that socially marginalized people in general and homeless people in specific are more likely to be negatively impacted in disasters in general and COVID-19 in specific, e.g. because of lower trust in authorities and the information provided by authorities [7,8].

Because of this, and as trust in government's information about COVID-19 was the most important variable influencing self-imposed social distancing, we conducted multivariate analyses to examine the variables influencing this. Years at school was the most important explanatory variable, indicating that the more years at school the respondents have, the less trust respondents have in the information that the government provides on the ways of avoiding COVID-19 infection. This is surprising, as previous research from the general population indicates that individuals with low education (and low income) were more susceptible to conspiracy beliefs about the pandemic [33,34]. Among the other variables which were significantly related with higher levels of trust in authorities' COVID-19 information were: age (>60 years), being an immigrant/asylum seeker/living without permit and linking social capital. The relationship between age and trust is in line with previous research. In accordance with older age being a risk factor for more severe COVID-19 illness, several studies have found it to be positively related to higher risk perceptions of the risk related to COVID-19 [29–32]. The positive relationship between being an immigrant/asylum seeker/living without permit and trust in governments' COVID-19 information is surprising and interesting. Given e.g. asylum seekers' previous experiences with authorities in their home countries, it is not unreasonable to expect lower trust in authorities in this group (cf. [35]. A Norwegian study found that most migrants reported a high level of adherence to preventive measures (88%) and trust in Norwegian authorities (79%) [36]. The study reports, however, that there were variations among groups regarding the importance of sources of information and level of trust, which was lowest for the Polish group. Migrants are, however, a multifaceted group, and we might expect their trust in authorities to differ, e.g. based on the reasons for their migration status (cf. Olson et al. [40] for a discussion of COVID-19 impacts for migrants). This seems to be an important issue for future research.

The importance of trust in authorities' information as a motivation for self-imposed social isolation during COVID-19 compared with other types of motivation is interesting. This relationship presumably is due to the (unmeasured) fact that government information about how to avoid COVID-19, includes recommendations to avoid contact with people outside your current residence (i.e. self-isolate). Thus, it seems that respondents' perceived "duty" to self-isolate during the pandemic (based on the advice of the authorities) is their most important motivation. Our analyses indicate that this duty is a more important explanation for respondents' self-isolation than their worry about infection and their living conditions, as the latter did not contribute significantly in the multivariate analyses. The extent to which this is really related to duty (i.e. "internal motivation") or fear of legal/economic sanctions (i.e. "external motivation") will probably vary depending on the social distancing rules and the level of enforcement in the studied countries. This is an important issue for future research, as knowledge on the motivations for self-imposed social isolation is an important precondition for future protective behaviours.

5.4. Methodological weaknesses and issues for future research

The first main methodological weakness of the present study is the relatively small samples of respondents: we have only 173 respondents from the four countries. This means that the general sample is small, and that the country samples are even smaller. That is why we have not compared countries, but rather different categories of socially marginalized groups. To examine a potentially confounding influence of country in the analyses, we have conducted the multivariate analyses controlling for the four countries (as a dichotomous variables). The main results were not changed when controlling for countries, indicating that there is no major confounding influence of country in our data, when it comes to these issues.

We recommend that future studies examining further the themes that we discuss here, include larger samples of socially marginalized people. This is required to establish robust conclusions. Data collection during the pandemic has, however, been challenging, especially when dealing with socially marginalized people facing difficulties because of the pandemic. Another potential challenge related to the small sample, is the issue of representativity. With the low number of respondents, it is reasonable to ask whether they actually are representative for their different groups. Unfortunately, it is impossible to calculate response rates, due to the method of survey distribution.

The second main methodological weakness of the study is the differences between the national samples. The different categories of socially marginalized people that we compare are unevenly distributed in the national samples, and this is an important weakness. While previous studies of socially marginalized groups tend to focus only on people living on the street or under temporary arrangements [9], the present study focuses on a broader spectrum of socially marginalized people; ranging from people living in their homes to people living on the street or under temporary arrangements. This is one of the unique contributions of the study. Our study also includes minorities, migrants, asylum seekers, undocumented immigrants, homeless women, people living on the street or under temporary arrangements. There are few studies exploring this spectrum of vulnerability. Gayer-Anderson et al. [2] assert that there is little research that has considered the psychological impacts of COVID-19 and other public health crises on socially marginalized populations. We focus more specifically on e.g. marginalized women in Olson et al. [41] and migrants, asylum seekers, undocumented immigrants in Olson et al.[40].

6. Conclusion

We find that the level of social isolation among the marginalized groups is comparable to that of the general population in previous studies. As hypothesized, we find that respondents living on the street or under temporary arrangements engage in less self-imposed social isolation than e.g. the respondents living in their homes. We find lower levels of risk awareness, social capital and trust in authorities' information about COVID-19 among people living on the street or under temporary arrangements. Only linking social capital and trust in authorities' information was related to respondents' social isolation. Thus, it may seem that respondents self-isolated because of "duty" and not worry for infection.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Tor-Olav Naevestad reports financial support was provided by European Union.

Data availability

Data will be made available on request.

Acknowledgements

Appendix 1. Level of infection per 100 000 inhabitants per month in four countries. December only includes until Dec. 14. Source (ECDC 2020)

Level of infection per 100 000										
	March	April	May	June	July	August	Sept	Oct	Nov	Dec
Norway	79.2	64.6	14.0	8.3	5.9	25.7	60.9	108.4	285.0	99.0
Portugal	62.4	177.9	73.1	94.5	87.1	67.1	164.9	608.7	1532.9	524.9
Estonia	53.9	71.8	15.0	9.2	4.8	24.3	71.1	109.9	549.6	453.1
Hungary	5.0	23.4	11.2	2.8	3.7	14.9	209.8	500.0	1451.0	683.0

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