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The impact of COVID-19 on pregnant womens' experiences and perceptions of antenatal maternity care, social support, and stress-reduction strategies

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ABSTRACT

Background: The COVID-19 pandemic has impacted on maternity care, supports and women's mental health.
Aim: The aim of this study was to assess pregnant women's satisfaction with antenatal care and social support and to examine stress-reduction strategies women used during the pandemic.
Methods: An online survey was conducted between June and July 2020. Pregnant women, aged over 18 years were recruited. The survey included closed and open-ended questions to assess women's perceptions and satisfaction with their antenatal care, social support, and stress-reduction strategies. Descriptive statistics and multivariate analysis were used for quantitative analyses; qualitative content analysis was used for open-ended questions.
Findings: 573 pregnant women completed the survey. Women reported low levels of social support which was predicted by women's mental health and demographic factors and was related to public health and maternity service restrictions. Women reported that restrictions implemented in the maternity services limited their face-to face interactions with healthcare professionals and meant their partners could not attend antenatal appointments or support them in the postpartum period in the maternity setting. The lack of information on COVID-19 and pregnancy meant women had greater uncertainty about pregnancy and birth.
Discussion: Our findings indicate how the lack of access to antenatal care and reduced perceived social support as a result of the restrictions implemented in response to the COVID-19 pandemic, potentially intensifies pregnancy specific stress.
Conclusions: There is a need for the provision of supportive care, both formally and informally, particularly with women who may be more vulnerable during a pandemic.

Statement of significance

Problem or issue

The provision of care and support during pregnancy is public health concern short and long-term health of women and children.

What is already known

The transitional nature of pregnancy can result in increased levels of prenatal maternal stress underscoring the need for both formal and informal support from health professionals and social networks.

What this paper adds

This study provides additional evidence that highlights that restrictions implemented due the pandemic negatively impacted social support and increased prenatal distress. Further illustrating the importance of supportive and accessible antenatal care during the pandemic.

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1. Introduction

On January 30th, 2020, the World Health Organisation declared the outbreak of COVID-19 to be a public health emergency of international concern, and subsequently the provision of health-care services have been significantly disrupted globally. Systems and processes changed within maternity services in order to minimise the risk of COVID-19 transmission to women, their infants and healthcare staff [1]. These changes included a decreased number of antenatal appointments, with many appointments offered online or via telephone, with very few face-to-face meetings [2]. Evidence indicates that women were anxious about attending hospital appointments during the pandemic [3], thus appointments being made available online can be viewed as a positive response to challenges currently being experienced. Other changes have been less positive, such as reduced choice for women in terms of place of birth and ability to have their partner with them during labour [2]. Further, as healthcare professionals also have a high risk of COVID-19 infection [4], there may have been fewer healthcare professionals available to care for pregnant women [5].

Models of antenatal care, and satisfaction with care provision, are always influenced by local contexts and resources [6,7]. Key issues for women in the antenatal period include waiting times, the provision of information, healthcare professional's attention to individual concerns, control, choice and continuity of care [8–10]. Women's satisfaction with maternity care is now an agreed indicator of the quality of care [11], as poor satisfaction with care can result in delayed engagement with care or non-attendance during the antenatal period in the current and/or subsequent pregnancy [12,13]. Research indicates that non-attendance results in poor obstetric outcomes including undetected intrauterine growth restriction, higher rates of preterm birth and perinatal mortality [14–18]. Therefore, it is of the utmost importance to assess women's satisfaction with antenatal care during the pandemic to help determine strategies that may help optimise engagement with these services.

It is also important to assess and support women and their partners during pregnancy, given that it represents a major transitional phase in their lives. This transition to parenthood can be experienced positively or negatively as it results in significant changes to the lives of pregnant women, their partners and their families [19–22]. In addition, the transitional nature of pregnancy can result in increased levels of prenatal maternal stress [23], which can also have significant adverse mental and physical health outcomes for women and their children [24–27]. Therefore, many women engage in stress-reduction and support-focused strategies during pregnancy to support their health and well-being. Informal support can include those strategies women engage in to help cope with stress and pregnancy such as engagement community groups, peer-to-peer support groups and the provision of childcare supports. Informal supports also include social support from significant others, family and friends, which all demonstrate benefits for obstetric, maternal and child outcomes [28,29]. More formalised supports include those provided by healthcare providers in antenatal care, which can provide opportunities for women, their partners and healthcare providers to positively impact on maternal-child health [30–33]. While evidence for stress-reduction interventions and strategies is inconsistent [34], an important and consistently protective factor relates to women's perceptions of formal and informal support, which can help to mitigate adverse outcomes [35]. Hence, it is crucial to explore these factors in the context of the pandemic to develop and implement adequate interventions and strategies for pregnant women.

There is emerging evidence that the onset of the pandemic and pandemic-related restrictions including physical distancing requirements and lockdown requirements have resulted in increased prenatal maternal stress and reduced perceptions of support [2,3,36,37]. Given the importance of social support and satisfaction with antenatal care during pregnancy, understanding the impact of COVID-19 on these informal and formal supports is essential to support pregnant women during this period. Thus, the aim of this study was to assess pregnant women's satisfaction with antenatal care and social support in addition to examining the stress-reduction strategies employed by pregnant women during the COVID-19 pandemic.

2. Methods

2.1. Study design and procedure

An exploratory international cross-sectional survey was conducted online, with data collected between June 16th and July 17th, 2020. Online recruitment was conducted via pregnancy forums (e.g. What To Expect, Mumsnet) and social media (e.g. Facebook, Instagram), whereby women were provided study information and a link to the online survey if they wished to participate. Women were eligible to participate if they were aged 18 years or older. There were no exclusions based on gestational age, nationality, or geographical location.

2.2. Survey

The survey was designed to examine women's stress, social support, mental and physical well-being, satisfaction with antenatal care, and general and COVID-19 related health behaviours. Socio-demographic data related to age, ethnicity, nationality, country of residence, relationship status, gestation, parity and gravidity were collected from all women. This study and related survey are part of a larger body of work regarding Prenatal Stress, Health, Health Behaviours, Social Support and antenatal care during the COVID-19 pandemic, full details of which are reported elsewhere [37,38]. For the purposes of this study, the quantitative measures for satisfaction with antenatal care and social support are outlined below. Further quantitative findings related to stress, mental and physical health and behaviours are reported elsewhere [37].

Quantitative measures

2.2.1. Satisfaction with antenatal care

Two factors from the quality of prenatal care questionnaire (QPFQ) [39] were used to assess women's perceptions and satisfaction with the antenatal care provided to them during the pandemic period. Specifically, the questions from Factor 1: Information sharing (including 9 items on how antenatal care providers answer questions, keep information confidential, and ensure women understand reasons for tests and their results), and Factor 5: Availability (including 5 items assessing whether women know how to contact the antenatal care provider and how available the maternity staff or prenatal care provider is to respond to questions, concerns or needs) were included. These items were measured on a 5-point likert scale from "strongly disagree" to "strongly agree". The reliability coefficient of this scale in the current study was $\alpha = .93$.

The general satisfaction items from the WHO Antenatal Care Assessment of Perceived Quality of Care questionnaire [40] were also used. These questions assess women's satisfaction with: the number of antenatal check-ups (response options were: would like more, would prefer fewer, the number was right); number of

antenatal appointments compared to the number expected (response options were: more than expected; less than expected; about the same as expected); the time between check-ups (response options were: too short; too long; about right); waiting time in the hospital for appointment (response options were: satisfied with waiting; not satisfied); length of time with the doctor/nurse/midwife during appointments (response options were: would like a lot more time; would like a little more time; time is about right). Additional questions assessed women's general level of satisfaction with the antenatal care received in the unit/hospital (response options were: very satisfied, satisfied, not satisfied), whether the woman would go back to the unit/hospital in a subsequent pregnancy (response options were: no, yes, don't know) and whether the participant would recommend this clinic to a relative or friend (response options were: no, yes, don't know).

Given that the length of a questionnaire and repetition of similar questions can have an impact on response rate the study team chose to focus on the WHO scale and compliment it with the QPFQ factors. With this is mind, questions assessing pregnant women's satisfaction with sufficient time, approachability and availability have been covered by the items included from the WHO scale.

2.2.2. Social support

The 12-item Multidimensional Scale of Perceived Social Support (MSPSS) measured participants' perceived level of social support from three main sources: family, friends and loved ones. Items were measured on a 7-point scale from "very strongly disagree" to "very strongly agree". The reliability coefficient of the MSPSS in the overall sample was $\alpha = .96$; reliability of the significant other subscale was $\alpha = .98$, the friends subscale was $\alpha = .96$, and the family subscale was $\alpha = .94$.

2.2.3. Qualitative open-ended questions about stress and stress reduction strategies

At the end of the survey, open-ended questions explored women's experiences of stress and their stress reduction strategies during the COVID-19 pandemic. These four open-ended questions were as follows: 1) During your pregnancy, what have you found most stressful? 2) When you feel stressed, what do you like to do to reduce your stress levels? 3) If you feel stressed, what supports and/or services do you use, want or need? Why? 4) Can you describe what other types of supports and/or services you feel would help you?

2.3. Analysis

2.3.1. Quantitative data

For the purposes of this study, only findings related to satisfaction with antenatal care, and social support are presented as findings related to stress, mental and physical health and behaviours are reported elsewhere [37]. Descriptive statistics were calculated to describe sample characteristics in terms of sociodemographic factors, social support and satisfaction with antenatal care outcomes. Inferential statistics were performed to assess possible associations between variables. Chi square tests of independence were conducted to examine differences in satisfaction with antenatal care based on sociodemographic factors. Hierarchical multiple regressions were conducted to examine the role of sociodemographic factors and well-being variables (stress using the 4-item Perceived Stress Scale Short Form [41], and mental and physical health using the 12-item Short Form Survey (SF-12) [43]) in predicting social support and perceived quality of antenatal care. All data were analysed using IBM SPSS Version 26.

2.3.2. Qualitative data

Women's responses to the open-ended questions ranged from lists of strategies as well as short paragraphs that detailed their experiences of pregnancy during the COVID-19 pandemic. A qualitative content analysis, with an inductive approach was employed to analyse the data. The analysis firstly involved the open-coding of the data. Secondly codes were grouped together to create higher order categories which will allow for a better understanding of the phenomena being explored. The data were analysed independently by two researchers [removed for blinded peer review] using both Excel and Nvivo 12. A consensus discussion regarding theme development was undertaken with all co-authors, a multi-disciplinary team with the disciplines of health psychology, social sciences, and occupational health represented. The final phase of analysis is abstraction whereby the research phenomena are described and presented. Throughout the manuscript the qualitative findings are reported in conjunction with the quantitative when common themes were identified.

2.4. Ethical approval

Ethical approval for the study was granted by the Clinical Research Ethics Committee of [removed for blinded peer review] (Ref ECM 4 (zz) 10/01/12). Before completing the survey, women were provided with an information sheet and informed consent form. Women were informed that participation in this study was completely voluntary, there was no obligation to participate, and that choosing to participate or not would have no impact on their maternity care. As part of this consenting process women were informed that the information they provided would contribute to research publications and/or conference presentations. All participants provided informed consent before completing the online survey.

3. Results

Of the 584 who engaged with the online survey, a total of 573 (98.1%) pregnant women completed the survey. Of these, 558 (97.4%) provided responses to the open-ended questions. As illustrated in Table 1 the participating women were predominately from English speaking countries with 42.2% (n = 242) resident in the United States of America, 41.0% in Ireland (n = 235) and 9.9% in the United Kingdom (n = 57). Over half of women responded to the survey during their third trimester of pregnancy (55.1%; n = 310), and 42.4% (n = 243) of women were nulliparous. The majority of women were white, aged 30 years or older, married or cohabitating and with a higher education qualification.

3.1. Satisfaction with antenatal care

Based on data from the WHO Perceived Quality of Care scale, over half of women reported that they believed that the number of antenatal appointments they had during the pandemic was 'just right' (59.3%; n = 337, see Supplementary file 1). One third of women reported that the time between scheduled appointments was too long (34.3%; n = 196), and 20.9% (n = 125) were dissatisfied with time spent waiting in the hospital during antenatal visits. A hierarchical multiple regression was conducted to examine the role of sociodemographic factors and well-being factors (general stress, pregnancy-specific stress, COVID-19 related stress, social support, and mental and physical health) in predicting women's satisfaction with maternity services (Table 2). Preliminary analyses confirmed normality, linearity, multicollinearity and homoscedasticity. Sociodemographic factors were entered at Step 1 and explained

Table 1
Sample characteristics by parity.

	Nulliparous n(%)	Parous n(%)	Total
Age in years			
<25	21(8.8)	8(2.5)	29(5.1)
25–29	72(30.3)	41(12.7)	113(19.9)
30–34	90(37.8)	136(42.0)	229(40.4)
35–39	51(21.4)	114(35.2)	167(29.5)
≥40	4(1.7)	25(7.7)	29(5.1)
Trimester of pregnancy			
First	24(10.0)	51(16.0)	75(13.3)
Second	69(28.6)	108(34.0)	178(31.6)
Third	148(61.4)	159(50.0)	310(55.1)
Relationship status			
Married	174(71.9)	278(85.8)	457(80.0)
Cohabitating	39(16.1)	37(11.4)	76(13.3)
In a relationship	23(9.5)	6(1.8)	29(5.1)
Single	6(2.5)	3(0/9)	9(1.6)
Country of residence			
United States of America	104(43.2)	138(42.7)	242(42.5)
Ireland	89(36.9)	142(44.0)	235(41.3)
United Kingdom	32(13.3)	25(7.7)	57(10.3)
Other	16(6.6)	18(5.6)	35(6.2)
Ethnicity			
White	210(88.2)	299(92.6)	514(90.8)
Black	6(2.5)	3(0.9)	9(1.6)
Asian	5(2.1)	3(0.9)	8(1.4)
Hispanic	8(3.4)	5(1.5)	13(2.3)
Other included mixed ethnicities	9(3.8)	13(4.0)	22(3.9)
Education			
Non-degree qualification	53(21.9)	65(20.1)	118(20.8)
Undergraduate degree	91(37.6)	121(37.3)	212(37.5)
Postgraduate degree	98(40.5)	138(42.6)	236(41.7)

12.8% of the variance in satisfaction with maternity services. After entry of the well-being factors at Step 2, the total variance explained by the model was 24.1%, F (24, 473) = 6.25, p < .001. The well-being factors explained an additional 11.3% of the variance in satisfaction after controlling for sociodemographic factors; R squaredchange = .11, F change (6, 473) = 11.76, p < .001. In the final model, higher pregnancy-specific stress (beta = –.29, p < .001), and being resident in Ireland (beta = .17, p = .002), predicted lower satisfaction with maternity services. Higher social support (beta = .11, p = .009) predicted higher satisfaction with maternity services.

When women were asked what they have found most stressful in this pregnancy, the majority of responses were related to the impact of the COVID-19 pandemic (see Table 3 for qualitative themes and categories).

Under the theme maternity care impacted by COVID-19 (see Table 3), some women reported dissatisfaction with changes to the maternity services which were implemented to reduce the risks of transmission of the virus. Women reported, *"how the virus has ruined everything and changed maternity care"*, whereby routine antenatal appointments and antenatal/parenthood preparation classes were postponed, cancelled or telemedicine clinics were provided in lieu of in-person appointments. Women reported that antenatal care is "*vital*" with antenatal classes considered "*an essential service*" that needed to be promoted in order to empower women to maintain their health and wellbeing during pregnancy.

> "There is going to be a lot of fallout from these cancellations that no-one will really pay attention to but that will have a great effect on the women concerned e.g. back pain, pelvic floor dysfunction, breast feeding difficulties, PND [postnatal depression]" (P103; Ireland, 35–39 yrs, nulliparous, third trimester)
>
> "To have had classes as a first time mom, not just have classes cancelled and feel abandoned by the system. Medically I know I'm fine which is one thing but I've felt angry that nothing was put in place to replace the classes online. I would have liked more time with midwives to chat and get to know them or a doula that could be there on the day." (P206; Ireland, 35–39 yrs, nulliparous, third trimester)

Table 2
Hierarchical regression for satisfaction with maternity services.

	B	SE B	β	p	95% CI
Age	.087	.082	.054	.291	−.074 to .247
Parity (number of other children)	.432	.349	.058	.006	1.240 to .216
Gestational age	.060	.034	.077	.076	−.006 to .127
Annual household income	.000006	.00001	.063	.178	.000 to .000
Country of residence (other as reference)					
America	.825	1.310	.055	.529	−1.749 to 3.400
Ireland	−.3.064	1.343	−.204	.023	−5.703 to −.424
UK	−1.503	1.582	−.061	.343	−4.611 to 1.605
Relationship status (married as reference)					
Cohabiting	−.819	.927	−.038	.377	−.2.642 to 1.003
In a relationship	−864	1.457	−.026	.553	−3.727 to 1.999
Single	−.872	2.495	−.015	.727	−5.774 to 4.031
Education (secondary school as reference)					
Technical or vocational qualification	.581	1.813	.020	.749	−2.981 to 4.143
Non-degree qualification	−2.737	1.726	−.108	.114	−6.129 to .655
Undergraduate degree	−1.048	1.513	−.069	.489	−4.020 to 1.925
Postgraduate degree	−1.714	1.540	−.110	.266	−4.740 to 1.311
Doctorate	−1.497	1.853	−.054	.420	−5.139 to 2.145
Previous pregnancy loss (none as reference)					
Once	−.207	.732	−.012	.778	−1.645 to 1.232
Twice	−1.140	1.234	−.039	.356	−3.565 to 1.285
Three or more times	.109	1.466	.003	.941	−2.772 to 2.990
Pregnancy-specific stress (PDQ)	−.399	.071	−290	<.001	−.539 to −.260
General stress (PSS)	.152	.149	.059	.309	−.141 to .446
COVID-19 related stress	−.033	.126	−.013	.791	−.281 to .214
Health (SF-12 Mental Component Summary)	.051	.039	.078	.188	−.025 to .127
Health (SF-12 Physical Component Summary)	−.022	.037	.027	.555	−.051 to .094
Social support	.052	.020	.113	.009	.013 to .092

Note. Sociodemographic variables entered at step 1: age, number of children, average annual household income, country of residence, marital status, education level, previous pregnancy loss. Well-being variables entered at step 2: stress measures, mental and physical health, and social support. PDQ = Prenatal Distress Questionnaire PSS = Perceived Stress Scale SF-12 = SF-12® Health Survey.

Table 3
Content analysis of what have pregnant women found most stressful.

Themes	Sub-categories
Altered social networks and supports due to COVID-19	Increased reliance on partner
	Limited access to family
	Limited access to friends
	Limited access to group supports
	Feeling pretty unseen and uncelebrated
	Isolation and loneliness
Concerns related to Covid-19 infection	Maternal infection
	Infant infection
	Fear of pregnancy loss/adverse outcome
	Lack of evidence related to infection in pregnancy
	Potential separation from infant
	Others attitudes and non-adherence to public health measures
Juggling roles and responsibilities	Preparing for the arrival
	Preparing for parenthood
	Caring for other dependent children
	Home schooling due to COVID-19
	Lack of formal and informal childcare due to COVID-19
Maternity care impacted by COVID-19	Restrictions on partner presence at appointments/during labour/postpartum
	Poor communication/information provision
	Reduced time at appointments
	Telemedicine in lieu of in-person appointments
	Cancelled appointments including ultrasound
	Lack of trust in care
	Uncertainties around pregnancy and birth
	Need for formal supports from healthcare professionals
Occupational and financial concerns	Maternity leave logistics
	Fear of returning to the workplace
	Working on the frontline
	Feeling less productive
	Reduced income
	Concerns about unemployment
	Additional financial cost of rearing an infant
	Fear of not meeting financial commitments
Physical manifestations	Fatigue/exhaustion
	Nausea/morning sickness/hyperemesis gravidarum
	Pain and restricted mobility
	Low blood pressure
	Sleep disruption
	Managing gestational diabetes

3.2. Social support

A hierarchical multiple regression was also conducted to examine the role of sociodemographic factors and well-being factors (general stress, pregnancy-specific stress, COVID-19 related stress, and mental and physical health) in predicting women's overall perceived social support (Table 4). Preliminary analyses confirmed normality, linearity, multicollinearity and homoscedasticity. Sociodemographic factors were entered at Step 1 and explained 6.1% of the variance in perceived social support. After entry of the well-being factors at Step 2, the total variance explained by the model was 13.6%, $F(23, 474) = 3.25$, $p < .001$. The well-being factors explained an additional 7.6% of the variance in perceived social support after controlling for sociodemographic factors; R squared change = .076, F change $(5, 474) = 8.29$, $p < .001$. In the final model, age (beta = −.13, $p = .018$), number of children (beta = −2.27, $p = .006$), and being single (beta = −.14, $p = .002$) were negatively associated with social support, and mental health (beta = .14, $p = .024$) predicted higher perceived social support.

Under the theme maternity care impacted by COVID-19 (see Table 3), issues related to social support were commonly reported when women were asked about what was stressful in this pregnancy. Women felt that support from their significant other was diminished during this pregnancy due to restrictions put in place by the maternity hospital. Women reported both sadness and anxiety that their significant other could not be present as a support or to participate in antenatal appointments, at birth or during the postpartum stay in the hospital. Women were also aware of how restrictions on access and care differed between hospitals within the same geographic area, which added to their frustrations.

> "Having so many less appointments due to covid restrictions. My boyfriend not being allowed to attend any appointment or ultrasound for our baby" (P22; Canada, 30–34 yrs, nulliparous, third trimester)

> "Not having my husband as a visitor after our baby is born is honestly a horrific thought, it's the only thing I would change. But it's the worst possible thing that could happen to me." (P106; Ireland, 25–29 yrs, nulliparous, third trimester)
> "Restrictions have still not been lifted in 'Hospital A' whereas they have been eased in both 'Hospital B' and 'Hospital C'." (P160; Ireland, 35–39 yrs, multiparous, third trimester)

how broader social networks, as a result of COVID-19, caused stress during their pregnancy. At time of data collection, resident countries of all participants in the study had polices in place including, but not limited to, school and workplace closures; restrictions on public events and public gatherings; public transport restrictions; stay-at-home directives; restrictions on internal movements; and international travel controls. Although policies varied at national and subnational level, the majority of public health measures implemented by Governments restricted women's movement from their households and their contact with those outside of their direct households. Consequently, many women reported feelings of isolation and loneliness during their pregnancy.

> "The isolation of cocooning due to covid 19 and not really being able to carry out tasks or have freedom to roam." (P227; Ireland, 35–39 yrs, multiparous, first trimester)
> "Not being able to be around family and celebrate this happy time. Feeing so alone." (P1; USA, 30–34 yrs, nulliparous, third trimester)

Related to support, women with dependent children reported a number of difficulties during their current pregnancies that negatively impacted on their health and wellbeing. Public health measures saw the closure of schools, crèches/childcare facilities and many businesses implemented work from home policies. Women reported the difficulties that they encountered as a result of these restrictions as they struggled with juggling their dual-roles and responsibilities (see Table 3). Women described how they did not feel that they were "as productive" as they would normally be when working from home and this was a cause of stress as women reported having "concerns for my job". Concerns about security exacerbated fears of potential financial strain as circumstances change.

> "Working from home as a teacher while pregnant and minding my 1 year old while isolated from family due to covid restrictions" (P314; Norway, 30–34 yrs, multiparous, second trimester)

> "Having less energy but having to work from home with no childcare" (P266; Ireland, 35–39 yrs, multiparous, second trimester)

Table 4
Hierarchical regression for perceived social support.

	B	SE B	β	p	95% CI
Age	−.443	.186	−.127	.018	−.809 to −.077
Parity (number of other children)	−2.181	.792	−.136	.006	−3.737 to −.624
Gestational age	−.056	.078	−.033	.474	−.208 to .097
Annual household income	.000004	.00001	−.017	.732	.000 to .000
Country of residence (other as reference)					
America	.230	3.001	.007	.939	−.5.667 to 6.128
Ireland	−.1.945	3.076	−.060	.527	−7.990 to 4.099
UK	−2.691	3.621	−.051	.458	−9.782 to 4.425
Relationship status (married as reference)					
Cohabiting	−.135	2.124	.003	.950	−4.040 to 4.309
In a relationship	−.3.229	3.335	−.045	.333	−9.807 to 3.323
Single	−17.760	5.657	−.139	.002	−28.876 to 6.644
Education (secondary school as reference)					
Technical or vocational qualification	5.275	4.146	.084	.204	−2.871to 13.421
Non-degree qualification	−.162	3.955	−.003	.967	−7.933to 7.609
Undergraduate degree	1.700	3.465	.052	.624	−5.109to 8.508
Postgraduate degree	3.700	3.523	.111	.294	−3.222to 10.623
Doctorate	5.453	4.238	.091	.199	−2.875to .13.781
Previous pregnancy loss (none as reference)					
Once	.876	1.676	.024	.601	−.2.417 to 4.170
Twice	−.068	2.827	−.001	−.024	−5.623 to 5.486
Three or more times	2.383	3.357	.032	.478	−.4.213 to 8.978
Pregnancy-specific stress (PDQ)	−.193	.162	−.065	.235	−.511 to .126
General stress (PSS)	−.653	.341	−.117	.056	−1.323 to .017
COVID-19 related stress	−.188	.288	−.034	.513	−.754 to .378
Health (SF-12 Mental Component Summary)	.200	.088	.142	.024	.026 to .373
Health (SF-12 Physical Component Summary)	−.080	.084	−.046	.024	−.246 to .085

Note. Sociodemographic variables entered at step 1: age, number of children, average annual household income, country of residence, marital status, education level, previous pregnancy loss. Well-being variables entered at step 2: stress measures, mental and physical health. PDQ = Prenatal Distress Questionnaire PSS = Perceived Stress Scale SF-12 = SF-12® Health Survey.

> "Working from home with new job responsibilities, no childcare, and unclear expectations . . . I also hate being unsure what my job will look like when I return. At the best of times, maternity leave feels like a threat to ones career. Right now, it's really scary." (P378; USA, 35-39 yrs, multiparous, third trimester)
> "Working very long hours from home with reduced pay and impact on economy going forward." (P202; Ireland, 35–39 yrs, multiparous, second trimester)

3.3. Concerns related to the COVID-19 infection and pregnancy

Women also indicated how important good communication was during the antenatal period, especially to allay any fears, concerns or anxiety they may be experiencing during pregnancy. When asked to comment on their concerns linked to the pandemic, many of the women reported fears of contracting COVID-19 and what implications that would have for their health and the health of their infants (see Table 3). Women were aware that they were deemed to be a vulnerable population who may be at risk if they were to be infected, but that little was known or communicated to them about these risks. Women's responses indicated how the dearth of evidence and lack of information related to outcomes exacerbated these fears. Many of the women conveyed issues of control whereby the lack of information related to COVID-19 during the antenatal period worried them leading to uncertainties around pregnancy and birth, irrespective of parity. Women's preparedness was adversely impacted leaving women with a sense of powerlessness.

> "Conflicting advice and recommendations about covid 19 in pregnancy. Would have preferred more cautious guidance given lack of evidence." (P317; South Africa, 25–29 yrs, nulliparous, second trimester)
> "COVID- risk of infection and how little is known about how it affects pregnancy/new studies showing that it impacts the placenta. Worried about visitors after baby is here and if she gets it her suffering long term effects that we still don't know that much about." (P448; USA, 35–39 yrs, multiparous, third trimester)
> "The unknown about what it will look like in January when I give birth. Hoping my husband and mom can be there. Also worried if I were to have the virus they would keep the baby from me. Just a lot of unknowns, especially with pregnant women being in the high risk category now." (P536; USA, 30–34 yrs, multiparous, first trimester)

Under the theme concerns related to Covid-19 infection (see Table 3), women reported worrying about potential pregnancy loss and/or any adverse pregnancy outcome. Women described their fears around these potential adverse outcomes with one multiparous woman expressing how these restrictions and the lack of in-person contact with the maternity services left her feeling that her pregnancy was being dismissed until she transitioned into the second trimester.

> "Covid 19 & fear of miscarriage/foetal abnormalities" (P97; Ireland, 30–34 yrs, multiparous, second trimester)
> "Thinking I might be sick (specifically with the possibility that it may be COVID-19) at any small sign or symptom and how that it will affect my baby. Also concerned that any weird feeling is a sign of miscarriage." (P6; USA, 20–24 yrs, nulliparous, second trimester)

In response to women's worries about contracting COVID-19, some women reported that negative attitudes of family or friends towards public health measures were concerning to them. These pregnant women were worried that they were "high risk" if they contracted the infection and that they and their families had a responsibility to ensure they would not contract COVID-19. Others'

Table 5
Activities, including individual strategies, adopted by participants to relieve stress.

Activity	Strategies	N(%)
Connecting with others		242 (45.5)
	Talking to husband/partner	104 (19.5)
	Talk to family	79 (14.8)
	Talk to friends	72 (13.5)
	Talk to someone (unspecified)	35(6.6)
	Time with children	11(2.1)
	Time with pets	8(1.4)
	Contact with doula	1(0.2)
Exercise		218 (41.0)
	Walking	155 (27.1)
	Hike	2(0.4)
	Yoga	38(7.1)
	Pilates	3(0.6)
	Exercise (unspecified)	35(6.6)
	Swimming	5(0.9)
	Running	3(0.6)
	Cycling	3(0.6)
	Dance	1(0.2)
	Stretching	2(0.4)
Entertainment		101 (19.0)
	Music	22(4.1)
	Television	41(7.7)
	Reading	45(8.5)
	Podcast	6(1.1)
	Social media	9(1.7)
	YouTube	2(0.4)
Rest and relaxation		129 (24.2)
	Relax	37(7.0)
	Time out	2(0.4)
	Isolate	7(1.3)
	Sleep	25(4.7)
	Nap	40(7.5)
	Bathing	44(8.3)
Complementary and alternative therapies		84 (15.8)
	Breathing techniques	27(5.1)
	Meditation	49(9.2)
	Mindfulness	2(0.4)
	Hypnobirthing	7(1.3)
	Therapy	10(1.9)
	Reflexology	1(0.2)
Connecting with nature		13(2.4)
	Gardening	2(0.4)
	Outdoors	11(2.1)
Home activities		11(2.1)
	Baking	5(0.9)
	Cooking	2(0.4)
	Cleaning	5(0.9)
Hobbies		19(3.6)
	Writing and journaling	7(1.3)
	Knitting	6(1.1)
	Paint	1(0.2)
	Sewing	1(0.2)
	Art	2(0.4)
	Puzzles and games	2(0.4)
Organisation		10(1.9)
	Plan	5(0.9)
	Learn/research	4(0.8)
	Prepare for baby's arrival	2(0.4)
Emotional Expression		16(3.0)
	Cry	15(2.8)
	Scream	1(0.2)
Food and drinks		20(3.8)
	Drink tea	4(0.8)
	Drink water	1(0.2)
	Eat	13(2.4)
	Go to café or restaurant	2(0.4)
Other		15(2.8)
	Shop	1(0.2)
	Keep busy	1(0.2)
	Distracting activity	6(1.1)
	Drive	4(0.8)
	Pray	4(0.8)
	Not returning to work	1(0.2)
	Work	1(0.2)
	Face mask	1(0.2)
	Help with childcare	2(0.4)
	Use of a Doppler to hear the fetal heartbeat	1(0.2)

Note: Strategies are not mutually exclusive and therefore percentages are greater than those reported within the activity category.

attitudes and non-adherence to public health measures resulted in additional stress to these pregnant women. In response to these concerns, and in order to minimise their risk of potential infection, women restricted access and contact to their own family meaning their support networks were more limited as a result.

> "Dealing with friends and family that do not take pandemic and precautions seriously that want to see us and baby. Political disagreements." (P569; USA, 25–29 yrs, nulliparous, third trimester)
> "Pressure from friends to hang out which I don't feel comfortable doing during covid."(P73, Germany, 30–34 yrs, nulliparous, first trimester)

3.4. Stress reduction strategies and support needs

Of the 573 women who responded to the survey, 92.8% (n = 532) reported 69 individual strategies they used to help with their stress during the pandemic. As outlined in Table 5, the most common activities that respondents engaged in to reduce women's stress were connecting with others (45.5%; n = 242) and exercising (41.0%; n = 218). This was also reflected in the responses women provided when asked what supports they used and/or would help reduce their stress. During the pandemic, pregnant women relied heavily on informal supports reporting that they depended on their partner, family and friends to help alleviate stress. However, as illustrated below, women reported how they felt that this support was limited.

> "I haven't felt I couldn't manage any stress on my own or with the support of family so have not needed to access support." (P162; Ireland, 30–34 yrs, multiparous, first trimester)
> "Feeling pretty unseen and uncelebrated by most friends and family as we anticipate the arrival of our first child, thanks to the pandemic and social isolation." (P394; USA, 30–34 yrs, nulliparous, third trimester)

Many women reported that they would like access to more dedicated formal supports, such as an identified contact person who can provide support and reassurance to women during the pregnancy. Supports that pregnant women reported wanting and needing during the pandemic were not limited to midwifery and obstetric staff but also included perinatal mental health services and counselling services.

> "Online chat with midwife/hospital, easy access to contact." (P244; Ireland, 30–34 yrs, multiparous, third trimester)

> "More access to counselling or doctors visits which are all limited due to covid" (P22; Canada, 30–34 yrs, nulliparous, third trimester)

"It would be great to have someone to check in on a pregnant woman's mental health as her pregnancy progresses as I think that this is a majority neglected area." (P240; Ireland, ≥40 yrs, multiparous, unspecified trimester)

4. Discussion

This study assessed pregnant women's satisfaction with antenatal care and social support, in addition to examining the stress-reduction strategies employed by pregnant women during the COVID-19 pandemic. Despite challenges and restrictions, maternity services have had to continue providing a full range of services to the pregnant population. Our findings illustrate that the majority of pregnant women who participated in this study were satisfied or very satisfied with the antenatal care provided to them during the pandemic. Our findings also illustrated that stress and social support are strong predictors of satisfaction with services; and that women would like additional antenatal visits and more time with healthcare professionals during antenatal visits. The qualitative findings indicated that when women reported dissatisfaction with maternity services, it was mostly linked to COVID-19 related restrictions implemented, which resulted in antenatal appointments and classes being cancelled, postponed or delivered through telemedicine clinics. This study's findings also indicate that the stress-reduction and support-focused strategies women engaged with to manage stress during the pandemic are in keeping with strategies previously reported before the pandemic [38]. For instance, women reported that they relied on informal supports, particularly support from partners, families and friends, in to help cope with stress and support their wellbeing. However, our findings also indicate that social supports were hampered due to the pandemic. Women reported conflict with their social support networks, resulting in feeling overwhelmed with responsibilities and feelings of isolation in their communities. They also requested more formal supports to be made available.

One of the key components to quality maternity care is having access to the appropriate care at the appropriate point in time [44]. To date, there are significant barriers in place for women to access and engage with maternity services [17]. Research also indicates that despite an agreed schedule for care, variation in access to services still exists within systems [44,45], with the most vulnerable women least likely to access maternity care [46,47]. The qualitative findings from this study further illustrate that barriers to equitable access and dissatisfaction with quality of care may be intensified by ad-hoc policies implemented to restrict the transmission of COVID-19 by services. The restrictions on partner's attendance at appointments or during birth was of particular concern, and this has also been reported elsewhere [36]. Such restrictions have been met with criticism as the long-term impact on maternal-child health is considered [28,48]. It has been posited that limited face-to-face management and engagement with women by healthcare providers and the removal of support by partners during antenatal appointments and birth may make women more vulnerable, potentially increasing the risk of postpartum depression [28,48]. Given that governments, policy makers and healthcare professionals must continue to implement strategies to suppress the transmission of COVID-19, our findings suggest that there is a need to consider socio-demographic and geographical factors in order to ensure the equitable delivery of high quality care that pregnant women will be satisfied with [1].

In a Canadian study, social support was found to be a key factor in promoting access and engagement with maternity services in vulnerable populations [49]. This is in keeping with our finding that "connecting with others" was the main stress-reduction strategy women reported engaging with during the pandemic. This is further indicated in our findings whereby perceived social support was a strong predictor of satisfaction with maternity care. To date, restrictions implemented during the pandemic have been reported to place increased limitations on women's social support [36,50]. The pregnant women in this study reported experiencing isolation and loneliness, and discussed the difficulty of navigating through their pregnancy with limited social support. These experiences were often reportedly in addition to juggling parental and work responsibilities, without formal childcare due to global closures of schools and childcare facilities. These findings highlight that during the perinatal period, given the magnitude of changes to their lives, women are in need of additional social support. In support of our findings, Chivers (2020) also reported that women have been denied the opportunities to engage and strengthen their relationships with family, friends and other pregnant women as a result of COVID-19 related restrictions resulting in feelings of isolation and loneliness [3]. Our findings also demonstrate that some pregnant women distanced themselves from their social networks if they felt that those networks were not responding appropriately to public health measures, including physical distancing and mask wearing. Chivers (2020) reported similar inter-family conflicts in their Australian study [3]. This could potentially compound poor prenatal mental health when women experience the conflict of wanting to spend time with others and receive social support during their pregnancy but have the conflict of needing to step away from this support due to other's behaviours and beliefs about COVID-19. Unsurprisingly, experiencing reduced support during this vulnerable period is reported to result in impaired psychological wellbeing by women in our study. At present, it is impossible to determine what the full ramifications of COVID-19 infection and related restrictions. However, social isolation results in poorer wellbeing and it is likely that the wellbeing of pregnant women will be negatively impacted by the pandemic in both the short and long-term [28]. This is supported by evidence of women in our study requesting access to additional support services including mental health services.

As reported in our corresponding paper, the pregnant women participating in this study reported high levels of pregnancy-specific stress and stress related to the COVID-19 pandemic. The findings in this study further indicate how lack of access to antenatal care contributes to this pregnancy-specific stress, and can result in poor satisfaction with the maternity services. For instance, pregnant women in this study reported fears about the potential adverse pregnancy outcomes linked to the COVID-19 pandemic. These findings are in keeping with an Irish study which illustrated that women in their second and third pregnancy trimester were concerned about the infection of their dependent children and their unborn infant(s) [36]. Our findings also illustrated how pregnant women were aware that there was a dearth of information related to pregnancy outcomes and COVID-19, which lead to uncertainty and a lack of control. These findings are in line with an Australian study, which observed that women in the perinatal period are highly motivated to seek tailored information to reduce risk including information related to self-isolation and safety whilst pregnant [3]. Information provision is an essential element of good quality antenatal care and the lack of nuanced information related to COVID-19 means pregnant women felt disempowered. In our study such disempowerment appeared to be heighted rather than allayed by public health measures. Our study illustrated how women struggled to comprehend how to prepare for delivery and birth, compounded by the fact that they did not know if their partner could attend to support them.

Implications for practice

National and international guidelines reinforce the importance of the provision of antenatal care that reflects best practice. As a response to the COVID-19 pandemic, maternity services provided across various health systems have changed, and the findings from this study illustrate that these changes have impacted on women's mental and physical health. Our findings also indicate that there is scope for improvements that can be made to services further emphasising the importance of supportive and accessible antenatal care during the pandemic. During routine antenatal visits, early assessment to ascertain women's well-being and stress, and potentially modifiable sources of stress would be beneficial. Such assessments will allow appropriate formal and informal supports to be shared with pregnant women and their families during this major transitional phase in their lives. The pregnant women in this study also indicated that there was a need for an improvement of information provision. Developing and disseminating accessible information related to pregnancy that is specifically tailored for provision during a pandemic, such as web-based antenatal classes, would be beneficial allowing for individuals to better prepare for pregnancy and birth in this context. Such practice-based strategies would be valuable to empower pregnant women and their families, which may positively impact on maternal-child health as well as satisfaction with the services.

4.1. Strengths and limitations

One of the main limitations of this study was the potentially limited generalisability of the findings to all populations of childbearing women, as our participants were predominantly white, married women, who were aged 30 years or older from majority English speaking countries that were educated to degree-level or higher. These biases may reflect the levels of access to the internet in these high-income countries. On the other hand, this study's online approach to data collection, also represented a strength as it enabled engagement with this potentially vulnerable group that would have been difficult due to the restrictions implemented during the pandemic. Another limitation of this study is that this study did not measure attendance for antenatal care but rather assessed women's satisfaction with the number of appointments compared to the expected appointments. Further research would be required to examine the pattern of attendance at antenatal care appointments during the pandemic, women's satisfaction with the care provided, and the impact, if any, changes in antenatal care may have on adverse outcomes for women and their infants. A strength of this study is the high response rate to the open-ended questions providing the study with a large sample size for qualitative analysis. This study is of particular relevance as public health measures to the pandemic are still being implemented worldwide and recommendations for improving measures related to maternity must be informed by the experiences of those who are directly affected by the measures.

5. Conclusion

This study provides additional evidence that contributes to the growing body of research outlining the importance of supportive and accessible antenatal care during the COVID-19 pandemic. Our findings indicate dissatisfaction with the reorganisation of maternity services in response to the pandemic, whereby limited face-to face interactions with healthcare professionals and restrictions on partners in the maternity setting contributed to women's pregnancy specific stress. The changes to the maternity services, brought about by the pandemic, had an impact on the level of social support experienced by women during their pregnancy. The difficulties reported by women were not limited to the restrictions placed on their social connections but included the lack of access to formal supports within the maternity services to allay fears of the potential impact of COVID-19 on both mother and infant. These findings underscore the need for maternity services restrictions to take into account the importance of providing accessible and appropriate supportive care, both formally and informally, particularly with women who may be more vulnerable during a pandemic.

Ethical statement

All procedures were approved by the University College Cork School of Public Health Research Ethics Committee and the Clinical Research Ethics Committee of the Cork University Teaching Hospitals.

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Author contributions (blinded for peer review)

SM conceptualised and designed the study, analysed the data, wrote and revised the final manuscript. SL conceptualised and designed the study and critically reviewed and revised the manuscript. EOK designed the study, contributed to analyses and critically reviewed and revised the manuscript. JP contributed to study design, collected data and assisted with data analysis, critically reviewed and revised the manuscript. KMS conceptualised and designed the study, collected and analysed the data, and critically reviewed and revised the manuscript.

Conflict of interest

None declared.

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Appendix A. Supplementary data

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