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Sharing positive behavior change made during COVID-19 lockdown: a mixed-methods co-production study

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Abstract

Objective: The negative consequences of COVID-19 national lockdowns have been well documented, including the worsening of mental health for many, and the amplification of pre-existing inequalities. As a counterpoint, the current study utilises a mixed-methods co-production approach to share psychosocial insights into the adoption of positive changes made during national lockdown in Scotland. The study examined: i) the psychosocial patterning of positive behavior changes, ii) the psychosocial processes by which positive change was realised, and worked with partner organizations to share these insights. **Methods**: A sequential mixed-methods design included an online survey (n=2445) assessing positive changes in sleep and physical activity patterns, and the role of socio-demographics, mood, social support, coping, and resilience, with multivariate logistic regression analysis. Interviews were employed with a purposive diverse sub-sample of people self-reporting high levels of positive change (n=48) and used thematic analysis. **Results**: The survey identified positive behavior change was significantly patterned by age, gender and vulnerability to COVID-19. Higher levels of positive reframing and active coping in relation to stress were associated with higher levels of positive behavior change. Higher symptoms of depression, planning, and self-distraction were associated with less positive behavior change. Thematic analysis showed the centrality of perceptions of time, opportunities to self-reflect and engage with the natural world, access support in diverse ways, actively build routine and purposefully build self-efficacy and a sense of control were key to initiating positive change. **Conclusions**: The current study yields insights into achieving positive behavior change at a time of international crisis.

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Globally COVID-19 national lockdowns have represented the most significant restrictions on everyday life within living memory. While they have been successful in relation to their primary goal of reducing exponential transmission of COVID-19, they have also yielded a range of unintended consequences. Many of these consequences have been pathogenic, particularly in relation to the worsening of mental health (O'Connor et al., 2020) and amplification of pre-existing health inequalities (Wright et al., 2020). As a counterpoint, here a novel salutogenic perspective is taken, examining and then sharing the positive behavior changes that people reported.

Salutogenic approaches focus on the factors that support and promote health, particularly during stressful conditions (Antonovsky, 1979; Bauer et al., 2020). Within the context of COVID-19, applying this framework facilitates an examination of the positive adaptation and growth that may have been experienced by some individuals, including what can be learned about how and why some people have adapted and thrived during the national lockdown context and what might be amenable to change within the wider population. Salutogenesis can be realised through modifiable behaviors, personal resources, social capital or capabilities. It can include socioeconomic factors, social support, mood, coping and resilience, defined as "assets" which are important for achieving positive health outcomes.

The ability to adapt positively to COVID-19 may be linked to resilience, at both an individual and community level. It has been shown that when faced with stress and adversity

some individuals are more psychologically resilient than others (Riehm et al., 2021). Killgore at al. (2020) examined the factors that were associated with greater psychological resilience during the early stages of the nationwide lockdown in the United States. They found that resilience was higher for those who spent more time outside, exercised more, slept more and perceived better levels of social support. These findings highlight the importance of positive health-related behaviors in contributing to an individual's psychological resilience. In addition, research has shown that resilience at the community level, including community cohesion and collective efficacy, can enable people to react positively to crises, such as natural disasters and epidemics (Koliou et al., 2020).

Other factors linked to the successful adaptation to stress are social support and coping (Ye at al., 2020). Emerging evidence suggests an important role for these "assets" in people's responses to COVID-19. For example, Fluharty and Fancourt (2020) found that those who were using avoidant coping styles (e.g., behavioral disengagement, denial, substance use), included those with lower socioeconomic status, higher levels of loneliness and those experiencing COVID-19 related adverse events. These groups have also been identified as experiencing poorer mental health during the pandemic, suggesting that coping strategies can influence how effectively people manage the stress of the pandemic. In contrast, Gori et al. (2020) found that the use of approach coping (e.g., planning and active coping) was associated with lower levels of COVID-19 stress.

In addition to the role of psychological factors in enabling positive adaptation to COVID-19, social factors are also influential. Recent evidence has suggested a social patterning of positive changes experienced during COVID-19 national lockdown with findings revealing differences in the amount of positive changes that different sub-populations have experienced (Cornell et al., 2020; Williams et al., 2021). Specifically, those reporting higher

levels of positive change were female, from younger age groups, married or living with their partner, and in better health. These results suggest that some groups were better able than others to take advantage of national lockdown as an unexpected catalyst for positive change and point to the exacerbation of existing inequalities experienced by marginalized groups.

Both Williams et al. (2021) and Cornell et al. (2020) also report on the types of positive changes that people experienced during the pandemic. The positive changes reported by Williams et al. (2021) in their survey of Scottish adults included: being more appreciative of things usually taken for granted, spending more time doing enjoyable things, having more time in nature or being outdoors, paying more attention to personal health, increasing physical activity, and having more quality time with partner or spouse. In their study of Australian adults, Cornell et al. (2020) found three main positive changes: the opportunity to spend more time with family, appreciating having more flexibility in work arrangements, and enjoying a less busy lifestyle.

Positive changes have also been observed in health-related behaviors, with Janssen et al. (2020) reporting that although levels of sedentary behavior increased during lockdown, levels of moderate to vigorous activity increased and participants reported sleeping longer at night. It was also noted that participants who changed one behavior positively were also more likely to report a positive change in another demonstrating an important clustering in positive behavior change. Within the survey component of the current study, this clustering of positive behavior change was further investigated by focusing the analysis on an overall measure of positive behavioral change, incorporating sedentary behavior, physical activity, and sleep. Doing so allows the analysis to examine the factors associated with positive change beyond those associated with one specific outcome (e.g. physical activity alone) and

allows integration with the findings from the qualitative study where participants spoke about positive change across multiple behaviors.

Through a mixed-methods approach, the current study has three main foci. It examines the psychosocial patterning of positive behavior changes and the psychosocial processes by which positive change was realised. In addition, the paper outlines the process by which the project team worked with partner organizations to share the project's insights and co-produce positive change-sharing, targeted resources. To our knowledge, the current study is novel in focusing on a mixed-methods, salutogenic approach to COVID-19, and reporting on the rapid co-production of research-led resources intended to share insights into initiating positive change with people who may benefit.

Consequently, there are three key research questions (RQs): (1) Which psychosocial variables were associated with making positive behavior changes?, (2) What were the psychosocial processes by which positive change was initiated?, and (3) How can this learning be rapidly shared with partner organizations to co-produce positive change-sharing targeted resources? For RQ1, it is hypothesised that positive behavior change during lockdown will be positively associated with higher levels of resilience and social support, and negatively associated with avoidant coping, and lower mood.

Method

The sequential mixed-methods design involved a quantitative cross-sectional online survey and qualitative in-depth interviews (reported according to the Mixed Methods Article Reporting Standards (MMARS; Levitt et al., 2018). Subsequently findings were integrated. All materials and procedures were approved by the Ethics Committee of the University of

Strathclyde, Scotland, UK (Ref 61/05/05/2020 A Williams) and all participants provided informed consent.

Part 1 - Quantitative study

The survey sample comprised 2445 participants (participant characteristics are shown in Table 1). Data collection took place from 20 May 2020 to 12 June 2020, spanning the 9th to the 12th week of the first national lockdown in Scotland. This period was part of the first UK-wide lockdown that commenced in March 2020. People were advised to 'stay at home' and work from home wherever possible, only leaving home for essential purposes. These essential purposes included food shopping, medical appointments or to provide care for a vulnerable person. People were also allowed to leave home for one form of exercise each day. The target population of the survey was adults, aged 18 years or older, currently residing in Scotland, who were interested in sharing their experience of positive change. Participants were primarily recruited through social media advertisements on Facebook and Twitter, which directed participants to the online survey on Qualtrics.

Measures

Socio-demographic characteristics included age, gender, relationship status, ethnicity, education, income, and employment status. Participants also self-reported on their perceived health and whether they were high risk for COVID-19. Sample characteristics are shown in Table 1.

Behavioral outcomes: physical activity and sedentary behavior were assessed by the short form of the International Physical Activity Questionnaire (Craig et al., 2003) to derive duration of time spent sitting, walking, and in moderate-to-vigorous physical activity (MVPA). Sleep duration was assessed by self-reported number of hours sleep per night. Participants

completed these behavioral measures to reflect a normal week pre-lockdown and their current behavior (i.e. during national lockdown).

Psychological measures: Social support was assessed by the Brief Perceived Social Support Questionnaire (Lin, Hirschfled & Margraf, 2018). The Brief COPE inventory (Carver et al., 1997) was used to assess the seven coping strategies of positive reframing, acceptance, planning, humour, active coping, emotional support, self-distraction, and instrumental support. The resilience dimensions of personal competency and social resources were assessed by the Resilience Scale for Adults (Friborg et al., 2005). Symptoms of depression and anxiety were assessed by the 4-item Patient Health Questionnaire (Kroenke et al., 2009). These measures all show acceptable internal consistency.

Statistical analysis

Following the process of Janssen et al. (2020) the changes in sleep, sitting, walking and MVPA that participants had experienced from pre-lockdown to lockdown were categorised as either 'positive change', 'negative change', 'no change' and 'already optimal' based on previously reported categorizations for levels of physical activity (Ekelund et al., 2016), sitting (Stamatakis et al., 2019) and sleep (the National Sleep Foundation's Sleep Duration Recommendations). As the project's primary interest was in positive change across multiple behaviors an additive positive behavior change score was created as primary dependent variable. This was the % of possible positive behavior changes achieved on the four behavioral domains (sitting, walking, MVPA, sleep). Utilising a % score allowed for the factoring in of behaviors for which participants were already scoring optimally with no positive change possible. For example, if someone was already sleeping optimally pre-lockdown no further positive change could be recorded and therefore the % score was

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calculated as: number of positive changes divided by three instead of four. A dichotomous variable was then created for the purposes of logistic regression analysis reflecting participants who had made 50% positive behavior changes or more (n=926) vs. participants who had made less than 50% positive behavior changes (n=1519). The decision to create this new dichotomous outcome variable instead of using the original % scores was made because of the complexity of the underlying % values which resulted in seven different % possibilities, which were not equally spaced (see supplementary file 1 for the distribution of these scores). Creating the new dichotomous variable therefore gave a more interpretable outcome for the logistic regression analysis. Univariate and multivariate binary logistic regression analyses were carried out to determine the factors associated with positive behavior change on this composite measure. All analyses were conducted using IBM SPSS Statistics (version 25) at 5% significant levels.

Part 2 Qualitative study

A purposive sub-sample of survey respondents reporting high levels of positive change was identified. Within this larger sample, using a sampling matrix, the project sought to recruit a purposive sample in relation to representing those from diverse ethnic backgrounds, an equal span of gender, a range of educational attainment, income and diverse relationship status. Of 118 people approached 48 took part in interviews (see Table 2 for the sociodemographic characteristics of the interview participants). Interviews were conducted by the research team after bespoke training had ensured shared approaches to data collection drawing on interpretative phenomenological analysis to elicit particularly in-depth, rich, personal accounts (Smith, Flowers and Larkin, 2009). A topic guide (see supplementary file 2) was used within the interviews to guide the interaction; this had a salutogenic lens and covered the broad arc of people's COVID-19 experiences from early on within the pandemic, through

initiating and then maintaining positive changes. Throughout, participant disclosures were followed by tailored questions concerning thoughts and feelings relating to their experiences. One interviewer (BM) conducted the majority of interviews (n=39). Remote semi-structured interviews took place between 12 June and 24 September 2020 and were approximately 50 minutes in length. Interviews took place at a variety of times and in a range of modalities according to participant preference, and included platforms such as Zoom, Skype and telephone. Audio recordings were collected using dedicated voice recording devices only.

To accommodate the relatively large sample size it was not possible to conduct IPA at this scale. Hence, we drew upon Braun and Clarke's (2006) approach to thematic analysis. Transcripts were uploaded to coding software program Nvivo. Across the project initial open coding (n=27), sharing its inductive routes with IPA, was followed by more deductive coding (n=21) as the analytic framework developed and was reified over time to reflect the claims we were making for the sample as a whole. Initial analysis was conducted by one researcher (BM) under the supervision of a senior qualitative research expert (PF) to provide a reliability check. Supervision consisted of focussed discussions on data interpretation, thematic coherence, and the inter-relationships between the thematic entities.

Integration of findings

To integrate the findings of the two contributing studies, their key results were firstly entered into a single table. Drawing on the constant comparative method (Glaser and Strauss, 1967) two researchers (LW and PF) independently analysed the key results, focusing on areas of similarity and difference and generating interpretative statements of the overall meaning of the two contributing studies. Subsequently they met to share their interpretations and agree

a consensus position. Their work was then audited by the wider CATALYST team to ensure its validity, coherence and substantiation.

Results

Quantitative study

As shown in Table 1, there was a good age distribution among participants from 18-24 (9.7%), 25-34 (16.9%), 35-49 (26.2%), 50-64 (34.4%) to 65+ (12.8%). The majority of the sample were female (81.5%). Most participants were employed (67.6%) and educated to university level (74.1%). In terms of self-reported health, 15.2% identified that they were at high-risk of COVID-19 due to underlying health conditions or age.

Insert Table 1 here

Insert Table 2 here

Factors associated with positive behavior change

Univariate analyses showed that the following factors were significant predictors of positive behavior change and were therefore included in a multivariate logistic regression analyses using stepwise selection: age, gender, relationship status, employment status, self-reported health, being in a high-risk group, social support, anxiety, depression, both of the resilience variables and all of the coping variables. However, ethnicity ($p=0.105$), education ($p=0.506$) and income ($p=0.072$) were not associated with the extent of positive behavior change and were therefore not considered in a multivariate model (full details of the outcome from the univariate analyses can be found in supplementary file 3). Please note that the 65+ age group was used as the reference group as this is the age in the UK by which someone is typically considered to be an older adult.

In the final multivariate model eight factors emerged as significant predictors: these were

age, gender, high risk status, symptoms of depression, positive reframing, planning, active

coping, and self-distraction. When considering the coefficients (see Table 3), those aged 25-

34, 35-49 and 50-64 were all more likely to report making ≥50% positive behavior changes

compared to those 65+. Those who were female were more likely to report making ≥50%

positive behavior changes compared to males. Those who were at high-risk of COVID-19

were less likely to have reported positive behavior change. Higher levels of positive

reframing and higher active coping with stress were associated with being more likely to

have made ≥50% positive behavior changes. Higher symptoms of depression, and higher

levels of planning, and self-distraction were associated with being less likely to have made

positive changes across behaviors.

Insert Table 3 here

Qualitative study

The inductive thematic analysis highlighted six inter-related themes which reflect key

psychological processes reported by the participants. Although the themes are presented in

a linear fashion it is important to remember that they are inter-related, as shown in Figure 1.

Insert Figure 1 here

Time and opportunity: *'the construct of time has changed over the last couple of months'*

(IP5)

Participants talked about how lockdown had removed many of the life's routines and

associated demands. Regular time commitments such as commuting, transporting children,

many forms of socialising, or caring duties were removed. For some, these new time

opportunities were quickly filled with other demands such as child care and home schooling,

but for many participants it was as if the momentum of pre-COVID life was lost and the passage of time distorted, giving them a new clarity about time as a resource. They were able to think about, and enact, new ways of restructuring their lives in ways that worked positively for them:-

> Well, I suppose my life's slowed down massively. Like, we're really busy with family, we've got two kids [.....]. I suppose having people over all the time – like, the kids have friends over all the time, and maybe being forced to stop it made me realise that we needed to slow the pace down massively because it wasnae actually enjoyable before. (IP42)

> With lockdown, you know, you sort of like lose the whole structure. So you do... at least, I realised that I do have a choice to dictate what I want to do in the morning, you know, or what time I want to end the day. (IP1)

In summary, this theme has shown how lockdown brought an apparent slower pace of life which facilitated an evaluation of *how* they wanted to manage time and live their lives more positively where possible.

Reflection and appraisal: '*it gave me time to reflect on kind of what's important in my life*' (IP41)

As indicated above many participants reported that lockdown facilitated a 'stepping back' and appraisal of their lives and the way they were living and their life priorities. Participants talked of lockdown as meaning that they were '*escaping the noise*' (IP35) and were able to reflect on their lives in new ways. As one participant said, such reflections were '*quite fundamental to – to making change you actually want to, like, see*'. (IP50). The extracts below illustrate the importance of this reflection and appraisal:-

> I suppose it gave me time to reflect on kind of what's important in my life.[.....] So it was kinda reflecting, you know, reflecting on things that were important and what you do and why you do them, if you know what I mean? (IP41)

Appraisal and reflection were important as they enabled participants to generate solutions to on-going problems such as key aspects of their relationships, or developing new solutions to issues such as sedentary behavior or diet. For example:-

> I believe for the first time in my life – and I think my wife has experienced the same thing – we've had the kind of psychological breathing room to kind of understand ourselves and our difficulties. So whether those are mental health difficulties or for me a lot of it's been difficulties in kind of conceptualising ideas. A lot of that has now kind of all come together with this new-found kind of freedom. (IP35)

In summary this theme has shown how the lockdown restrictions provided distinct opportunities for some participants to reflect and appraise key aspects of their lives. This was pivotal to understanding the adoption of various positive changes.

The limits of control and agency: '*focus on what you can do, what you can control, and what you can't control'* (IP47)

This theme highlights the importance of perceived control in shaping the initiation of positive change. As global events, legislation, government policy and news reporting continually highlighted a lack of personal control, many participants had initially felt deeply distressed. However, the identification of the distinction between things that were possible to change (e.g. physical activity, immediate environment and work tasks) and things that were not, was centrally important for this sample of people reporting high levels of positive change:

> I think when you're just forced into like, you've got more, I just thought, 'Well life's slowed down considerably,' and we had a lot more time to think about things and I suppose I wasn't a very good, it just felt like my life had been put on hold and I didn't really have control over anything anymore. And there were only a couple of things that you really had control over. So I just decided to control the few things that I could. (IP47)

For others, the locus of what they perceived as changeable related to their immediate environment:-

> I would also say, you know, what has been… you know, in my kinda darkest days, sometimes just breaking it down to basics is helpful. So if I'm, if I'm having a really crappy day and I'm not feeling good at all, I will just clean and hoover [….]. And that gives me that sense of, you know, this is my world, I can run my world the way I want to run my world. The rest of the world we'll get to in a minute, but for now, let's hoover the rug, you know? (IP25)

In summary this theme has highlighted how perceptions of a loss of control due to COVID-19 were often effectively countered by the identification of pragmatic locus of control, which in turn enhanced feelings of agency and self-efficacy.

Planning, goals, and feedback: '*I decided to get a routine*' (IP4)

This theme highlights how processes of planning, goal setting and developing new habits were important in relation to positive change. Many of the participants highlighted that these processes were vitally important to them. The extracts below show how the extra time afforded by lockdown was important in thinking about goals and making the planning of activities associated with positive change more realistic.

> Yeah, well, 'cause people always have goals, but they [cuts out] can be quite vague. So during lockdown when you had more time to think about it, you're like 'Well, I'm not' – I had so much less to do, why not just get some paper out, think about what I want, and then you can start creating an actual path towards that. (IP50)

Other participants talked about the importance of planning *per se* in enabling positive changes to occur:-

> Just keep – you know, have a kinda 'to-do' list every day, couple o' jobs on it for yourself, your own sanity. Keep yourself busy. Like, make plans for around the house. Like, "Tomorrow I'm gonna paint the fence," or whatever. Or go a walk to – or even, like, we did things wi' the kids like scavenger hunts. (IP42)

In summary, this theme highlighted that establishing routines through planning and achievable goal setting were important catalysts to initiating positive changes during lockdown. Some participants charted their changes in diaries and others sought out and discussed their achievement with others.

Connecting to the natural world: *'going out watching the flowers coming out'* (IP14)

This theme shows that during lockdown participants felt that connecting to and exploring the natural world, helped them to be more positive. The extract below introduces this theme and sharply contrasts the pre-COVID world with the experience of lockdown:-

> So I hope, it's certainly been my experience, I've, and my family, we've been rediscovering simple pleasures like watching the blue tits in the bird box. [Laugh] or a really obvious, not obvious, but vivid example. We have rhubarb in the garden. It just grows there. For the last twenty years, but this year, I have noticed it unfurling its leaves more. (IP22)

Unlike the previous themes here there is little sense of active thought processes or deliberate cognition. In contrast to those reflective, agentic ways of achieving positive changes, this theme captures how for many participants being in the natural world was simply cathartic. There was a passive pleasure in engaging with the natural world. The extracts below stress this sensory quality:

> at one point I got really far, and it was just like quiet and it was a really nice day, and, yeah, it was just… it sounded like the sea a little bit, there was like seagulls that day, and it smelled like the sea as well, a little bit. So that was quite nice. I think that was like my favourite run, it was one of the longest as well. (IP18)

In summary this theme has highlighted how connection to and engagement with the natural world was positive for many participants. Of note, this was often described as a passive process of being immersed within the natural world and of taking simple sensual pleasures from watching birds, seeing flowers open and change, or smelling the sea or hearing the wind.

Connectivity, reaching out and support: *'I was doin' it for me but I was also doin' it to help other people'* (IP26)

This theme shows how positive change was achieved through reaching out to others for support, or providing support to others. Both routes were associated with positive changes to

health and wellbeing. Much but not all of this support was digitally mediated. Several

participants talked of using Instagram and Facebook for the first time, being connected to

others through 'likes' and shared interests, '*little kind of sharing a day by day' (IP14).* Others

used digital connectivity to form new social networks or to reinforce existing ones, to engage

in new activities or reengage with old (ballets, choirs, watching online performances), to be

part of activism and community engagement and to take an active role in fundraising. For

some digital connectivity made social support in local neighbourhoods real:-

> it's through social media. So it's Facebook Messenger or text messages. So we tend
> to communicate with each other like that [….]. And it means, and it's just simple
> things like making sure nobody runs out of bread or milk and stuff and it's been—
> just been really nice and I feel that we've really, really got to know our neighbours
> better than we ever thought we would because normally, you know, you're like
> ships in the night. (IP44)

For some new communities were created:-

> I realised that, oh, so I'm not the only one that's stuck in this or, you know, facing
> this set of emotions, and actually we kind of like... after a while, we actually formed
> our own, like, you know, WhatsApp group, 'cause, you know, we kinda like grouped
> together. You know, we would band together to do like quiz nights on Zoom, you
> know, share virtual recipes and things like that, 'cause... you know, it's kinda like a
> support group. (IP1)

In summary this theme has shown how important connecting with others was for making

positive changes during lockdown. The digital media were key to enabling new connections

to form and providing a means to meeting and engaging with others in the absence of risks

associated with COVID-19 transmission.

Integration of Findings

The integration of the key findings from the quantitative and qualitative components is

shown in Table 4. For each component, they key results were added to the table informed by

the outcomes of the logistic regression analysis and the main themes from the qualitative

analysis.

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Insert Table 4 here

Discussion

The current study took a novel salutogenic perspective to examine and then share the positive behavior change people reported during COVID-19. Supplementary file 4 presents a figure providing a high-level overview of national lockdown as a complex public health intervention. In relation to this figure, the current study has focused on understanding the unintended positive outcomes that may have arisen. Through a mixed-methods approach the project examined the psychosocial patterning of positive behavior changes and the psychosocial processes by which positive change was realised. The integration of the key findings highlight that enabling people to reframe the lockdowns, and particularly how they think about time, may be central to initiating positive change. They also suggest that taking active steps to adapt one's life through proactive self-reflection and appraisal was key to recognising opportunities to make positive change. The findings also suggested that re-asserting control through manageable goals was important. While the pandemic brought about a loss of control for many aspects of people's lives, those that concentrated on what they could control, and plan for, in their lives day-to-day were able to make positive changes. The data also suggested that self-distraction via engaging with the natural world was important in making positive changes, as was social connectedness.

Many of the current findings relating to positive change echo what is known about effective coping during times of stress. For example, previous research has shown that positive reframing and active coping leads to adaptive coping, whereas self-distraction and low mood are linked to poor coping (Sirios et al., 2015). In addition, our findings also speak

to the importance of mindfulness, social support, and helping others. These factors have also been identified as adaptive coping behaviors (e.g., Earnshaw et al., 2015) and are utilised as part of therapeutic approaches. One aspect of coping where the results of the quantitative and qualitative analysis appear to conflict is planning. However, the nature of the planning that people undertook is likely to be important given the uncertain nature of the pandemic. Those who focused on small attainable and realistic goals (versus longer term plans that may have been difficult to realise in the pandemic context), may have coped more effectively.

The findings raise longer term questions about COVID-19 recovery and what people want for themselves, their families, their workplaces and communities. In particular, time and opportunity were found to be central and provided a gateway to the realisation of positive change. Participants noted that many of the routines and demands of pre-COVID life (often linked to time poverty) had been removed, and there was a perception by many that they now had more time available. People appreciated the slower pace of life that this afforded them, and it also facilitated a stepping back for many people, allowing them to appraise and reflect upon issues in their lives and reassess their priorities.

The survey results also suggest that some groups experienced more positive behavior change than others. Amongst this sample of people recruited because they had experienced some positive change, older adults in particular, along with those who were high risk of COVID-19, males, and those with lower mood, made fewer positive changes. Previous work has also highlighted the social patterning of positive changes during COVID-19 (Cornell et al., 2020; Williams et al., 2021). The findings suggest that the pandemic has exacerbated inequalities in these groups, as well as other vulnerable and marginalised groups who have suffered the most through the pandemic. While additional support around coping skills and positive behavior change may be useful for some, there also needs to be a

focus on systemic change in order to reduce the harms caused by the pandemic and tackle inequalities in COVID-19 recovery.

A further aim of the study was to rapidly share the findings with partner organizations to co-produce positive change-sharing targeted resources. Partnership work was undertaken with three charity organizations with the aim of rapidly developing public-facing resources that could share insights from the project with those who might benefit the most. Community partner organizations were selected on the basis of early analyses of the social patterning of positive change (Williams et al., 2021). These findings highlighted that men had experienced less positive change so an organisation specialising in the promotion of men's mental health (Mind the Men) was approached. It was also found that older people were less likely to report positive changes so an organisation that focussed on older people's wellbeing (Scottish Older People's Assembly) was approached. To complement these population-specific organizations one organization with a particular behavioral focus on promoting physical activity (Actify) was also approached. To capitalise on the community partner organizations' expertise at working with their audiences/client base and their unique knowledge of how best to effectively communicate with them, findings were translated into a short report that provided a lay summary of the key findings from the qualitative components, provided 'top tips' for initiating positive change, and gave exemplar quotes from the interview transcripts (see supplementary file 5).

A flexible approach was taken with the partners about what they wished to do with the findings and enabled them to choose what and how to develop resources and in which modalities. The final resources developed by the project's partners included infographics, short films, and downloadable materials shared on the websites and social media platforms of the different organizations (accessible via https://www.actify.org.uk/catalyst). All

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materials were targeted at awareness raising and positive change-sharing in order to facilitate positive behavior change among those who may benefit. These materials represent a novel and initial attempt at salutogenic intervention development within the context of COVID-19. In terms of the post-pandemic recovery phase, the scaling-up of these intervention resources and further development of systemic salutogenic-based interventions may be useful for enabling communities to change positively and build resilience. The development of the lay summary and 'top tips' document was a key tool in facilitating the timely communication of the project's results to partners. Tools such as these are particularly effective in co-production projects with short time scales, such as this.

The current study also speaks to how researchers should operationalise and theorise salutogenisis. Although these focal points were not a primary concern of the work it is interesting to reflect on what was learned and of the uniqueness of conducting health psychology research within a rapidly unfolding pandemic. The decision to focus on learning from those who experienced positive change, and then share these insights with people who could potentially benefit from it, did shape the overall design and analytic foci. For example, the project did not aim to recruit a nationally representative sample for either the quantitative or the qualitative research. In relation to theory, although the project began with a broad interest in salutogenisis, this approach was not operationalized with apriori measures or anticipated pathways. Instead the approach has enabled insights into the psychological process and social patterning of positive behavior change along more typically inductive lines. This is perhaps indicative of the novelty and rapidity of the topic under investigation. However, the analyses do indicate a complex mixture of processes realised within individuals but also across social structures. For example, the importance of resilience relates to both individual properties but also their position within dynamic social networks.

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The strengths of the study lie in its originality and use of a mixed-methods approach. However, there are some weaknesses that need to be acknowledged. First, some groups, including males, those from lower education groups, and those from ethnic minority communities are under-represented in the survey sample. Due to the purposive sampling approach, the fact that these groups are under-represented may suggest that they were less likely to have experienced positive change. Indeed, the current analyses found that males were less likely to experience positive behavior changes than females. In addition, the sampling approach that was adopted for the qualitative component sought to overcome this limitation whereby a sampling matrix was used in order to recruit a balanced sample in relation to ethnic background, gender, educational attainment, income, and relationship status.

A further limitation relates to the retrospective nature of the baseline self-report measures of behavior which were taken at the same time as the lockdown measures. In addition, while wide range of socio-demographic factors were included in the quantitative analysis, the presence or age of children in the household was not included. It is also important to note that the outcomes reported here were experienced within the context of a national lockdown in Scotland, and the experiences of people living in other national lockdown contexts may have been different, particularly those countries that imposed stricter restrictions on time outdoors. In addition, due to the decision to focus on learning from those people who had experienced positive changes, the present study is unable to provide evidence on the barriers faced by those who did not make positive behavior change. A final consideration relates to the integration of the findings from the quantitative component and qualitative component. Although in the quantitative analyses the focus was on positive behavior changes across several behaviors, so as to make the results more

compatible with the qualitative analyses, the qualitative findings do capture more generalized behaviors than those assessed in the survey.

The current study is novel in taking a mixed-methods, salutogenic approach to COVID-19, and to report on the rapid co-production of research-led resources intended to share insights into initiating positive behavior change. A number of key psychosocial processes that were key to the initiation of positive change were identified, including adaptive coping techniques of re-framing, self-reflection and appraisal. In addition, the salutogenic resources that aim to promote positive behavior change represent a starting point from which future salutogenic approaches and interventions may be developed with a focus on building post-pandemic recovery and resilience across people and communities. In particular, targeted interventions are needed to address the inequalities in health that have been amplified by COVID-19, aimed at reducing the social and developmental harms caused by the pandemic.

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Table 1. *Descriptive sample statistics for socio-demographic and health variables*

Variable		N	%
Age	18-24	236	9.7
	25-34	411	16.9
	35-49	638	26.2
	50-64	838	34.4
	65+	312	12.8
Gender	Female	1956	81.5
	Male	451	18.5
Household income	<£16 000	238	10.9

	£16 000-£29 999	431	19.8
	£30 000-£59 999	876	40.3
	£60 000- £89 999	407	18.7
	£ 90 000+	224	10.3
Employment status	Employed	1649	67.6
	Inactive (e.g. retired, furloughed)	754	30.9
	Unemployed	37	1.5
Highest education level	High School	258	10.8
	College	360	15.1
	Undergraduate	723	30.4
	Postgraduate	1041	43.7
Ethnicity	White	2361	97.4
	Ethnic minority groups	64	2.6
Relationship status	Single	440	18.2
	Married or living with partner	1601	66.2
	Have a partner but not living together	187	7.7
	Separated /divorced or widowed	191	7.9
Health	Very poor	6	0.2
	Poor	43	1.8
	Fair	340	14.0
	Good	1113	45.7
	Very good	932	38.3
High-risk	Yes	370	15.2
	No	2070	84.8

Table 2. *Socio-demographic characteristics of the interview participants*

Variable		N	%
Age	18-24	6	12.5
	25-34	10	20.8
	35-49	9	18.7
	50-64	18	37.5
	65+	5	10.5

Gender	Female	24	50
	Male	23	48
	Transgender (female)	1	2
Household income	<£16 000	6	12.5
	£16 000-£29 999	11	22.9
	£30 000-£59 999	15	31.3
	£60 000- £89 999	7	14.6
	£ 90 000+	4	8.3
	Prefer not to say	5	10.4
Employment status	Employed	32	66.7
	Inactive (e.g. retired, furloughed)	16	33.3
	Unemployed	0	0
Highest education level	No qualifications	2	4.2
	High School	16	33.3
	College	3	6.3
	Undergraduate	8	16.6
	Postgraduate	19	39.6
Ethnicity	White	26	54.2
	Ethnic minority groups	22	45.8
Relationship status	Single	10	20.8
	Married or living with partner	28	58.3
	Have a partner but not living together	4	8.3
	Separated /divorced or widowed	4	8.3
	Other	1	2.1
Health	Very poor	0	0
	Poor	2	4.2
	Fair	6	12.5
	Good	22	45.8
	Very good	18	37.5
High-risk	Yes	4	8.3
	No	44	91.7

Table 3. *Multivariate analysis of socio-demographic and psychological factors predicting ≥50% positive change*

Variable	*p-value*	*Comparison*	*Coefficient*	*95% CI*	*p-value*
Age	.007	18-24 vs. 65+	1.37	.89-2.16	.158
		25-34 vs. 65+	1.65	1.13-2.39	.009

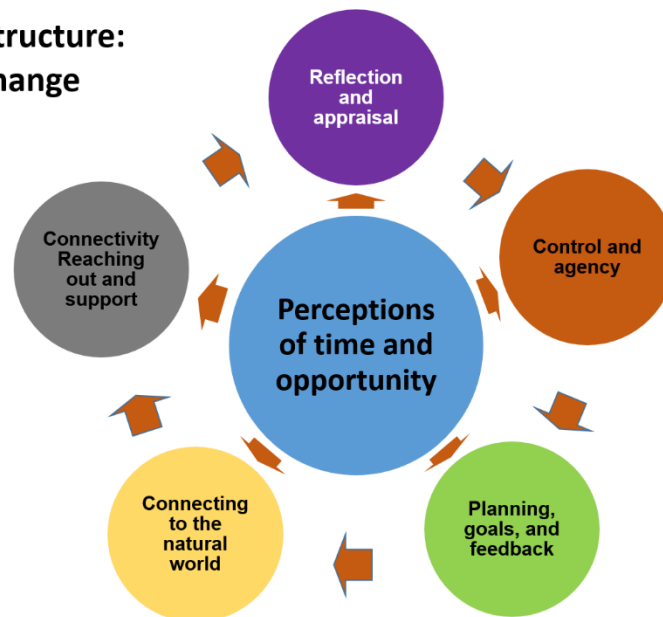|					
		35-49 vs. 65+	1.87	1.33-2.63	<.001
		50-64 vs. 65+	1.64	1.18-2.28	.003
Gender	.016	Female vs. Male	1.35	1.06-1.72	-
High risk/Shielding	.026	Yes vs. No	.722	.54-.96	-
Depression	<.001	-	.846	.79-.90	-
Positive reframing	<.001	-	1.32	1.16-1.50	-
Planning	.016	-	.789	.65-.96	-
Active coping	.013	-	1.28	1.05-1.56	-
Self-distraction	<.001	-	.819	.73-.92	-

Figure 1. *Depiction of the inter-relationship of key themes*

Table 4. *Integration of the main findings across the quantitative and qualitative studies*

Quantitative study	Qualitative study	Interpretation and synthesis
No effect of ethnicity, education, or household income on positive behavior change.		Due to the purposive sampling approach employed in the survey, we have a self-selected sample of people who experienced positive change. Therefore, we cannot conclude that ethnicity, education or income are not important in the realisation of positive change.
Those who were female were more likely to have made greater positive behavior change than males (final regression).		An initially surprising finding as other studies have pointed to women having experienced poorer mental health, in comparison to men, during the pandemic. But our findings are also consistent with emerging findings from Australia that also noted females were more likely than males to report experience a positive effect of the pandemic (Cornell et al., 2021). Men may need gender sensitized interventions.
Those who were shielding were less likely to have good positive behavior change (final regression).		Those who were shielding during the first lockdown would not have had the same opportunities for physical activity and engaging with nature. Many people who were shielding have reported a worsening of mental health, and feelings of a loss of control. People who were shielding may require targeted interventions and additional support.
Higher levels of positive reframing were associated with being more likely to have good positive behavior change (final regression).	The reality and perceptions of more unscheduled time enabled people to make positive changes within and across diverse domains	Both the qualitative and quantitative findings suggest that enabling people to reframe the lockdowns may be central to initiating positive change. For example, reframing the way we think about time is key to initiating positive change. Mass and social media messaging may be a helpful way of catalysing the reframing of the current situation.

Higher levels of active coping were associated with being more likely to have good positive behavior change (final regression).	The lockdown afforded particular opportunities to reflect and appraise one's life and consider making new and positive changes	Both the qualitative and quantitative findings suggest that taking active steps to adapt one's life through proactive self-reflection and appraisal was key to recognising opportunities to make positive change.
	People who reported initiating positive change highlighted the importance of a pragmatic locus of control: they focused on changing what was realistically controllable	Only the qualitative research suggested realistic control beliefs were important. While the pandemic brought about a loss of control for many aspects of our lives, those that concentrated on what they could control in their lives day-to-day were able to make positive changes. Encouraging people to appraise their control beliefs before attempting change may be important.
Higher levels of planning was associated with being less likely to have good positive behavior change (final regression).	Planning and realistic goal setting were important in initiating positive changes in lockdown. Monitoring by self and others was also important.	On face value the qualitative and quantitative work present contradictory findings. However, the nature of the planning that people undertook is likely to be important given the uncertain nature of the pandemic. Those who were making longer-term more difficult-to-attain plans may have been less likely to realise positive change due to the pandemic context. While others who focused on small attainable and realistic goals, concentrating on aspects of their life that they were still in control of, felt this was important for making positive change.
Higher levels of self-distraction was associated with being less likely to have good positive behavior change (final regression).	Starting to engage with the natural world was important in relation to being positive. These experiences were marked by a lack of cognition and had a meditative quality	These findings also seem to suggest a conflicting message over the role for self-distraction. Self-distraction can be useful for managing negative emotions, but the survey does not give us any information on the form of self-distraction that people undertook. The qualitative work chimes with wider evidence about the relative importance of the natural world for mental health and well-being.
Higher levels of social support were associated with positive behavior change (Univariate).	Positive changes were gained through reaching out and gaining social connection by benefiting the	The importance of social connectedness for making positive changes was reflected in both components. However, in the final regression analysis an individual's coping style was found to supersede the effects of social support.

Higher levels of social resources were associated with positive behavior change (Univariate).	self or by benefiting others; much of this new social connectivity was digitally mediated.