Risk and protective factors associated with change in well-being and mental health during the COVID-19 pandemic in South Africa

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Abstract

Objective:

The COVID-19 pandemic and associated restrictive measures affected the mental health and well-being of individuals globally. We assessed non-modifiable and modifiable factors associated with the change in well-being and mental health from pre- to during the COVID-19 pandemic in South Africa.

Methods:

A cross-sectional online survey was conducted from 26-April-2020 to 22-April-2021. Paired samples *t*-tests were conducted to assess change in well-being (measured on The World Health Organization-Five Well-Being Index (WHO-5)) and mental health (a validated composite psychopathology p-score). Sociodemographic, environmental, clinical and behavioral factors associated with change in outcomes were examined.

Results:

The sample comprised of 1866 adults (*M* age=44.26±17.26 years, female=78.9%). Results indicated a significant decrease in well-being ($p<0.001$) and increase in p-score ($p<0.001$) from pre- to during the pandemic. Having a prior mental health condition was associated with a worsening well-being score, while being female was associated with a worsening p-score. Being of Black African descent was associated with improved p-score and higher socioeconomic status (SES) was associated with improved well-being. Factors associated with worsening of both well-being and the p-score included adulthood adversity, financial loss since COVID-19, and placing greater importance on direct contact/interactions and substance use as coping strategies. Higher education level and endorsing studying/learning something new as a very important coping strategy were associated with improved well-being and p-score.

Conclusions:

Findings inform the need for targeted interventions to reduce and prevent adverse well-being and mental health outcomes during a pandemic, especially among vulnerable groups.

Keywords: COVID-19, pandemic, risk factors, protective factors, mental health, well-being

Significant outcomes

Findings indicate a significant decrease in well-being and an increase in psychopathology from before to during the COVID-19 pandemic.

Financial loss, and endorsing substance use and direct/personal contact as very important coping strategies, were significantly associated with worsening of both well-being and psychopathology.

Being of Black African ethnicity and endorsing studying/learning as a very important coping strategy were protective against worsening of both well-being and psychopathology.

Limitations

The cross-sectional design of the study does not allow for conclusions about causality to be made.

The convenience sample and lack of representative participation of all racial/ethnic groups limits the generalizability of findings.

Retrospective recall of pre-pandemic status may be vulnerable to recall bias.

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Introduction

Since its outbreak, the COVID-19 virus has infected over 771 million individuals and resulted in 6.9 million deaths globally up until 22nd October 2023 (World Health Organisation, 2023). In South Africa, over 4 million individuals have been infected with the virus (National Department of Health, 2023). In response to the outbreak, the South African government implemented a nationwide lockdown in March 2020 with stringent measures put in place to contain the spread of the virus. These measures included restrictions on movement, closure of schools and non-essential businesses and services, a travel ban, social distancing, and wearing of face masks in public (Salim and Karim, 2020; Rwafa-Ponela et al., 2022; Obasa et al., 2021). Five levels of lockdown were introduced with corresponding restrictions. Lockdown restrictions eased gradually between March (level 5) and September (level 1) in 2020 (South African Government, 2023). Following the implementation of the lockdown, many South Africans endured social and financial hardships. For example, the number of employed persons declined by 2.2 million from quarter 1 to quarter 2 of 2020 (Statistics South Africa, 2020). There was a rise in gender-based violence (GBV), with 2,320 cases reported in the first week of the lockdown (African Union Commission et al., 2020). Moreover, health services prioritized COVID-19 cases over other illnesses (Obasa et al., 2021) and access to chronic medications was limited, particularly in informal settlements and rural areas, disrupting care for people with chronic conditions (Human Sciences Research Council (HSRC), 2020).

Although the COVID-19 pandemic was recognized as an infectious disease crisis, associated restrictive measures had a significant impact on well-being and mental health globally (United Nations, 2020). Psychological responses to the pandemic included increased anxiety, stress, depression, and sleep disturbances (Kinser et al., 2021; Luo et al., 2020; Nguse and Vassenaar, 2021; Rwafa-Ponela et al., 2022; Wang et al., 2020). According to a systematic review, high rates of symptoms of anxiety (6.33% to 50.9%), depression (14.6% to 48.3%), PTSD (7% to 53.8%), psychological distress (34.43% to 38%) and stress (8.1% to 81.9%) were reported in the general population across eight countries during the COVID-19 pandemic (Xiong et al., 2020). Another study found that adults in South Africa reported significantly higher levels of anxiety, depression and stress symptoms compared to individuals in the United Kingdom, Australia and Ireland (Meaklim et al., 2021). In South Africa, psychosocial support was disrupted in both urban and rural settings, and the use of mental healthcare services decreased considerably due to fear and anxiety among patients of

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contracting the virus, loss of income and transportation difficulties (Salim and Karim, 2020; Nguse and Wassenaar, 2021; Rwafa-Ponela et al., 2022).

Although the pandemic impacted most individuals, vulnerable groups were disproportionally impacted. Studies in high-income countries identified several risk factors for poor mental health and well-being during COVID-19, including being female, under 30, single or separated, lower education level, pre-existing health conditions, low SES, financial loss, and exposure to COVID-19-infected individuals. (Banna et al., 2022; Nagasu et al., 2021; Rahman et al., 2020; Wang et al., 2020; Wang et al., 2021). Conversely, protective factors included resilience (Gilleen et al., 2021), taking precautionary measures (e.g., hand hygiene, wearing a mask; Wang et al., 2020) and positive coping strategies such as faith-based support (Budimir et al., 2021), keeping busy (Fuller and Huseth-Zosel, 2021), and engaging in exercise (Ogueji et al., 2022). However, limited research exists in low- and middle- income countries (LMICs), particularly South Africa. In a resource-constrained setting, it is integral to identify the risk and protective factors of well-being and mental health during a pandemic to guide future intervention and prevention strategies in times of crises.

Moreover, studies of COVID-19 have primarily assessed mental health and well-being during the pandemic (Alonso et al., 2021; Cao et al., 2020; Gloster et al., 2020; O'Connor et al., 2021), while very few studies have examined the change in these outcomes from the pre-pandemic period. Studies that have assessed this change have been conducted in HICs and found a significant decline in mental health and well-being (Bäuerle et al., 2020; Gilleen et al., 2021; Nogueira et al., 2021; Wanberg et al., 2020). There is a lack of published empirical research on risk and protective factors influencing the change in mental health and well-being over the course of the pandemic in LMICs. A change in these outcomes may have been influenced by various demographic, socioeconomic, clinical, behavioural and environmental factors, either non-modifiable or modifiable (Moreno et al., 2020; Solmi et al., 2022). Non-modifiable factors can serve to identify individuals at increased risk of mental health-related problems during a pandemic who might require specific interventions, while modifiable factors are actionable targets for prevention/intervention strategies (Solmi et al., 2022). Due to socioeconomic inequalities and a fragile health care system in South Africa, government strategies during a pandemic need to be evidence-based and tailored to the needs of at-risk population groups.

Current study

The Collaborative Outcomes Study on Health and Functioning During Infection Times (COH-FIT) is a global multi-language online survey measuring the impact of the COVID-19

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pandemic on physical and mental health and well-being (Solmi et al., 2022; Solmi et al., 2023). More than 185,000 surveys were initiated across the globe. In the current study, we report on survey findings from the South African adult population. We aimed to assess the change in well-being and mental health from pre- to intra-COVID-19 lockdown periods and to identify the non-modifiable and modifiable risk and protective factors associated with healthier and poorer outcomes.

Methods

Design

The COH-FIT study was a cross-sectional survey, accessible online on the COH-FIT website (www.coh-fit.com) and was available in English, isiXhosa, and 28 additional languages. The current study reports on data collected during the COVID-19 pandemic from 26 April 2020 to 22 April 2021.

Measures

Based on previous literature, several non-modifiable and modifiable risk factors that were found to influence well-being and mental health were selected (Solmi et al., 2022; Solmi et al., 2023).

Non-modifiable factors

Non-modifiable factors were separated into sociodemographic and environmental/clinical domains. Sociodemographic data including age, gender, race/ethnicity, education level, marital status, employment status and SES were collected. SES was measured on a visual analogue scale (VAS) where 0 = extremely below average, 50 = average and 100 = extremely above average. Environmental/clinical factors included urbanicity, current level of restrictions (no restrictions, recommendations to stay home only, sued or fined if leave home unless necessary, arrested if leave home unless necessary, and cannot go out under any circumstances), living with a family member, prior mental health condition, prior medical condition, family history of mental illness, and COVID-19 symptoms. Participants were also asked if they were exposed to any traumatic events during childhood and adulthood, such as physical, sexual, or verbal abuse, a major accident/injury/illness, and witnessing a traumatic event. Childhood and adulthood adversity were dichotomised as yes or no.

Modifiable factors

Modifiable factors were separated into behavioural (coping strategies) and environmental/clinical domains. Participants were asked to rate the importance of various

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coping strategies during the pandemic on a 3-point Likert scale (1=not important, 2= somewhat important, 3=very important). Coping strategies included direct physical contact or interactions, exercise/walking, gaming, internet use, keeping informed about the COVID-19 pandemic, meaningful hobby, media (TV, movies, radio, music) usage, social media usage, physical intimacy/sexual activity, spending time with pets, taking prescribed medications, religion/meditation/spirituality, studying or learning something new, use of substances (tobacco, alcohol, other), work (on site or from home) and other coping strategies. Environmental/clinical factors included financial loss measured on a 0 (no loss) to 100 (extreme loss) VAS, and access to protective devices (e.g., masks, gloves, soap, etc.) measured on a 0-100 VAS.

Outcomes

Outcome measures included well-being and a composite psychopathology score (p-score). Well-being was measured with the full WHO-5 questionnaire, (Topp et al., 2015), but with response options converted from a six-point Likert scale to a 0 (never) to 100 (every day) VAS. The well-being scale showed excellent internal consistency (a = .86). The p-score is a validated psychopathology measure comprised of symptoms across five mental health domains including anxiety, depression, post-traumatic stress disorder (PTSD), psychosis (hallucinations and delusions), and psychophysiological problems (sleep problems, stress and concentration problems). P-score items were extracted from validated measures, including the Generalized Anxiety Disorder-7 scale (Spitzer et al., 2006), Patient Health Questionnaire-9 (Kroenke et al., 2001), PTSD checklist for DSM-5 (Blevins et al., 2015), Prodromal Questionnaire-16 (Ising et al., 2012), and the World Health Organisation-5 well-being index (Heitor Dos Santos et al., 2018). Globally, the COVID-19 pandemic resulted in a wide range of mental health problems (Dragioti et al., 2021), suggesting the need for a multidimensional measure of mental health (Solmi et al., 2023). A single all-encompassing measure of mental health, as opposed to individual full-length measures, was intended to reduce the time taken to complete an online survey and increase completion rates (Solmi et al., 2023). As part of the COH-FIT study, we were able to validate the p-score used in our analyses (Solmi et al., 2023). In a validation study by Solmi and colleagues (2023), exploratory factor analysis and confirmatory factor analysis was used to extract a single "p-score" factor from multiple COH-FIT survey items across the five domains. Figure 1 illustrates the factor structure of the p-score and Table 1 indicates the domain item descriptions and scoring. Domain items were measured on a 0-100 VAS. The mean item score for each of the five domains was computed and then averaged to create an overall p-score (0-100). The p-score was found to have good

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concurrent validity and high internal reliability (ω = 0.95). Study outcomes were assessed for the retrospectively recalled period of two weeks of normal life prior to the local onset of the COVID-19 pandemic and for the last two weeks prior to taking the survey during the COVID-19 pandemic.

Participants and data collection

Non-probability convenience and snowball sampling procedures were used. There were three main methods of survey dissemination and participant recruitment in South Africa: (1) the survey was released to staff and students via Stellenbosch University's SunSurvey platform, (2) the survey was released on social media platforms, and (3) the survey was administered in communities by a research nurse. The sample consisted of 1866 adults aged 18 years and older (M = 44.26±17.36 years).

Statistical Analyses

Only respondents who provided responses to all items of two item outcomes, or to all items but one of three or more-item outcomes, were included in the main analyses. Multiple imputation by chained equations (using MICE algorithm with mice (Van Buuren and Groothuis-Oudshoorn, 2011) package in R) was used to impute the remaining missing items. Boxplots were used to identify outliers. Identified outliers were winzorized to the next highest non-outlying value.

IBM SPSS Statistics (Version 28, IBM Corp., 2021) was used to analyse the data. Sum scores for well-being and the p-score before and during the pandemic were computed. Paired samples *t*-tests were performed to compare outcomes before and during the pandemic. A significance level of $p < 0.05$ (2-sided) was used. Cohen's *d* was used to determine small (≤ 0.2), medium (≤ 0.5) and large (≤ 0.8) effect sizes (Sawilowsky, 2009). Difference scores were computed, indicating the change from before to during the pandemic, and used as outcomes for further analyses.

Descriptive statistics for all variables were computed. One-way ANOVA and independent samples *t*-tests were performed to explore significant relationships between categorical variables and continuous outcomes. Welch's test was used for groups with unequal variances. Given the large number of comparisons, Bonferroni corrections were applied to reduce the likelihood of Type 1 error. A corrected *p*-value of 0.002 (0.05/31 tests per outcome) was used to determine statistical significance. Pearson correlation analyses were conducted to assess the relationships between continuous variables and outcomes. Statistically significant factors were included in multivariate linear regression. Dummy

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variables were created for variables with multilevel categories. Two separate regression models were tested, one for each outcome. A significant *p*-value of <0.05 was used.

There was no issue of multicollinearity between independent variables in each of the models, indicated by variance inflation factor (VIF) scores <10 and tolerance values >0.1. Given the large sample size of the study, we assume that violation of the normal distribution did not negatively impact regression estimates (Schmidt and Finan, 2018). Homoscedasticity was established by visually inspecting residual plots.

Ethical considerations

The study received ethics approval from the Health Research Ethics Committee (HREC) at Stellenbosch University (ref: N20/04/007_COVID-19). Participants were asked to provide informed consent prior to participating in the survey.

Results

Sample characteristics

Sample characteristics are presented in Table 2. The majority of participants were in the 50-to-69-year age group (35.6%), followed by the 30-to-49-year age group (30.4%). Most participants were female (78.9%), identified as White (75.6%), had a college/university degree (66.1%), and were married or co-living with a partner (43.8%). Over half of the sample was unemployed (51.9%) and the overall SES was slightly above average (*M* = 60.88; *SD* = 19.26).

The majority of participants lived in a large city/town (53.4%). The most commonly reported restrictive measure was "recommendations to stay home only" (68.2%), and the least common was "cannot go out under any circumstances" (.4%). Nearly three quarters of the sample lived with a family member (72%). Half of the sample had a prior medical condition (50.3%) and were exposed to adversity during childhood (50.6%) and adulthood (49.6%). Nearly one third of the sample had a prior mental health condition (31.5%) and 42% had a family history of mental illness. Most participants did not report having any COVID-19 symptoms at the time the survey was taken (88.7%).

Change in outcomes from pre- to during the COVID-19 pandemic

Change in well-being and the p-score from before to during the COVID-19 pandemic are presented in Table 3. Results of the paired samples *t*-tests revealed a significant decrease in well-being ($t(1866) = -34.93$, $p<.001$) with a large effect size (Cohen's $d = .81$) and a

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significant increase in the p-score (t(1866) = 30.48, p <.001) with a medium effect size (Cohen's d = .71).

Non-modifiable sociodemographic factors

Sociodemographic group differences in well-being and p-score are presented in Table 4. Participants identifying as Hispanic (n=1), non-binary (n=10), and transgender/intersex (n=2) were excluded from analyses due to their small n. Although the inclusion of diverse groups provides greater generalizability, small sample sizes limit the ability to draw accurate conclusions. Independent samples t-tests indicated significant differences in the p-score between males and females (t(1835) = -3.6, p = .001). Analysis of variance indicated significant differences in the p-score between racial/ethnic groups (F(5, 137.0) = 8.5, p<.001). Additionally, significant differences in both well-being (F(2, 279.7) = 8.8, p <.001) and the p-score (F(2, 293.3) = 9.4, p <.001) were found across education level. Moreover, participants with a higher SES had significantly higher well-being scores (r = .099, p < .001).

Non-modifiable environmental/clinical factors

Group differences in well-being and p-score across non-modifiable environmental/clinical factors are presented in Table 5. Analysis of variance revealed significant differences in well-being scores between COVID-19 restriction levels (F(3, 210.9) = 5.1, p = .002). Participants who reported restriction level 4 (n=7) were excluded from analyses due to the small n. Independent samples t-tests revealed significant differences in the p-score for family history of mental illness (t(1861) = -3.4, p <.001), prior mental health condition (t(1857) = -4.8, p <.001), and exposure to childhood (t(1857.8) = -3.8, p<.001) and adulthood (t(1840.1) = -5.1, p <.001) adversity. Similarly, t-test results indicated significant differences in well-being for prior mental health condition (t(1023.9) = 4.0, p <.001) and adulthood adversity (t(1843.7) = 5.0, p <.001).

Modifiable behavioural factors

Table 6 presents the level of perceived importance of various coping strategies used during the pandemic. The most important coping strategy reported was internet usage (76.6%). Over 50% of participants reported that direct personal contact, exercise, hobbies, spending time with pets, media usage and work were very important coping strategies during the pandemic. Approximately 40% of participants reported that keeping informed about the pandemic and studying/learning something new were somewhat important, and over 30% reported that physical contact, exercise, hobbies, media usage, social media usage, physical intimacy, work and other coping strategies were somewhat important during the pandemic. The least important coping strategy was gaming (71.5%), followed by substance use (62.2%).

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Analysis of variance revealed significant differences in well-being between importance levels of direct personal contact/interactions ($F(2, 631.9) = 20.1$, $p < .001$), spending time with pets ($F(2, 924.8) = 8.6$, $p < .001$), using prescribed medication ($F(2, 1863) = 8.9$, $p < .001$), studying/learning something new ($F(2, 1863) = 14.6$, $p < .001$), and using substances ($F(2, 677.1) = 42.6$, $p < .001$). Similarly, significant differences in the p-score were found between importance levels of direct personal contact/interactions ($F(2, 657.1) = 22.2$, $p < .001$), spending time with pets ($F(2, 908.7) = 10.3$, $p < .001$), studying/learning something new ($F(2, 1863) = 9.5$, $p < .001$), and using substances ($F(2, 649.2) = 37.9$, $p < .001$).

Modifiable environmental/clinical factors

Pearson correlation analyses were perfromed to assess whether change in well-being and p-score were correlated with financial loss during COVID-19 and access to protective devices. Financial loss ($M = 35.0$, $SD = 31.9$) was significantly negatively correlated with well-being ($r = -.179$) and positively correlated with the p-score ($r = .166$). There was no significant correlation between access to protective devices ($M = 89.3$, $SD = 20.5$) and either outcome variable.

Multivariate regression models

The association between non-modifiable and modifiable factors and change in well-being is presented in Table 7. Factors significantly associated with greater worsening in well-being included having a prior mental health condition ($p = .027$), adulthood adversity ($p = .023$), endorsing direct personal contact/interactions as a very important coping strategy ($p < .001$), endorsing substance use as a very important coping strategy ($p < .001$), and greater financial loss since the COVID-19 pandemic ($p <,001$). Factors significantly associated with a smaller decrease in well-being included having a PhD ($p = .006$), higher SES ($p = .019$), and endorsing studying/learning something new as a somewhat important ($p = .004$) and very important coping strategy ($p < .001$). The model explained 11% of the variance in the change in well-being (adjusted $R^2 = .11$).

The association between non-modifiable and modifiable factors and change in the p-score is presented in Table 8. Factors significantly associated with greater worsening in the p-score included being female ($p = .04$), adulthood adversity ($p = .02$), endorsing direct personal contact as a very important coping strategy ($p < .001$), endorsing substance use as a very important coping strategy ($p < .001$), and greater financial loss since the COVID-19 pandemic ($p < .001$). Factors significantly associated with a smaller increase of the p-score included being of African-descent ($p < .001$), having a PhD ($p = .001$), and endorsing studying/learning something new as a very important ($p = .01$) and somewhat important ($p = .03$) coping

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strategy. The model explained 11% of the variance in the change in p-score (adjusted R^2 = .11).

Discussion

The current study assessed the impact of the COVID-19 pandemic on well-being and psychopathology, measured with the p-score (consisting of anxiety, depression, PTSD, psychosis, sleep problems, stress and concentration problems), in a South African adult population. To our knowledge, this is the first South African study to assess the risk factors associated with the change in well-being and mental health from before to during the COVID-19 pandemic. The current study found that both outcomes significantly deteriorated during the COVID-19 pandemic compared to the last two weeks before the outbreak. There was a significant decrease in well-being, with a large effect size, and an increase in the p-score, with a medium effect size. It is important to note that retrospective evaluation introduces recall bias and participants may have perceived their mental health and well-being more positively before than during the pandemic. Additionally, an expectancy effect may have occurred, such that individuals' expectations about the impact of the pandemic might have resulted in more negative responses (Cabelenis et al., 2014). Nonetheless, change in mental health and well-being found in the current study are supported by COVID-19 research conducted across various other populations (Bäuerle et al., 2020; Gilleen et al., 2021; Wanberg et al., 2020).

Non-modifiable risk and protective factors

In the current study, female participants had a significantly greater increase in psychopathology than male participants. This finding aligns with a previous study conducted in a LMIC which found that depression and anxiety increased especially among women from before to during the COVID-19 pandemic (Hamadani et al., 2020). Similarly, research in high-income countries has revealed higher levels of depression, anxiety, and stress among women during the pandemic compared to men (Gloster et al., 2020; Liu et al., 2021; O'Connor et al., 2021). This might be explained by an increase in domestic and childcare responsibilities falling on women during lockdown (Pillay and Barnes, 2020; Fancourt et al., 2021; Orkin et al., 2020) as well as an increase in intimate partner violence (Hamadani et al., 2020). Women also tend to ruminate more than men (Johnson and Whisman, 2013), which might have led to greater psychological distress, particularly in the context of COVID-19.

Consistent with our expectations, higher SES was significantly associated with a smaller decrease in well-being. Similarly, studies conducted in Japan, the US and the UK found that

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poorer health, lower well-being and psychological distress were more common among lower SES groups (Lee and Singh, 2021; O'Connor et al., 2021, Nagasu et al., 2021). Individuals with higher SES were likely able to work from home, have spacious living arrangements, stable internet access and food security (Reeves and Rothwell, 2020), contributing to better well-being. Other studies, however, had yielded contrasting findings (Banna et al., 2022; Wanberg et al., 2020). For example, a study conducted in Bangladesh found that having a higher family income was significantly associated with higher levels of stress during the pandemic (Banna et al., 2022).

A smaller increase in psychopathology was found among participants of Black African descent. A previous South African large-scale survey yielded similar findings, revealing less psychological distress among Black South Africans during the pandemic compared to their White counterparts (Orkin et al., 2020). Additionally, a study conducted in the UK found that participants of ethnic minorities did not have significantly worsened mental health outcomes during COVID-19 (Lewis et al., 2022). This finding is contrary to expectations as Black South Africans predominantly live in disadvantaged communities characterised by financial constraints, inadequate health care, food insecurity, and other inequalities, which were exacerbated during the lockdown period (Pillay and Barnes, 2020). However, this population group might exhibit greater resilience given their ongoing exposure to adversity, as documented in previous research (Jefferis and Theron, 2018; Theron, 2016; Van Breda and Theron, 2018). andand.

In the current study, having a PhD was associated with higher levels of well-being and lower levels of psychopathology. Some studies have found that higher education was associated with lower levels of depression, stress negative affect, and higher levels of well-being (Gloster et al. 2020; Wang et al., 2020), while other studies have reported an increased risk of mental health problems (Banna et al., 2022; Kar et al., 2021; Wang et al., 2020).

Consistent with previous research (Lewis et al., 2022; O'Connor et al., 2021), the current study found that participants with a pre-existing mental health condition had significantly poorer well-being compared to those without. This might be due to limited support from clinical services and a lack of psychosocial programs for those with mental health issues during the pandemic. Health care services in South Africa paid little attention to the mental well-being of those providing or seeking healthcare, as government funding was redirected to the testing and treatment of COVID-19 cases (Rwafa-Ponela et al., 2022). Additionally, failure to access services due to fears of contracting the virus might have resulted in exacerbation of symptoms. This suggests again that individuals with a pre-existing mental

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health condition are at an especially high risk of worsened well-being during times of crises and require appropriate monitoring and support measures (Alonso et al., 2021).

Participants exposed to adulthood adversity had a significantly greater increase in psychopathology and decrease in well-being. While trauma exposure is a well-established risk factor of mental health problems (Atwoli et al., 2013; Van Zyl et al., 2017), this risk factor may become accentuated in the context of COVID-19. In prior studies, threats to personal safety during lockdown were associated with increased levels of depression and anxiety (Keynejad, 2023; Wright et al., 2020). South Africa has seen a drastic increase in GBV since the start of the pandemic (Ngusa and Wassenaar, 2021). Women were confined to their homes with their abusive partners for a prolonged period, increasing the level of physical, sexual, and emotional abuse (Leburu-Masigo and Kgadima, 2020). Additionally, lockdown restrictions and the re-prioritisation of healthcare services to COVID-19 infections disrupted accessibility to services for victims of GBV (African Union Commission et al., 2020). Future disaster management plans should include risk mitigation strategies for trauma-exposed individuals to lessen the physical and mental health effects of pandemics.

Modifiable risk and protective factors

The current study found that certain coping strategies endorsed during the pandemic were associated with poorer mental health and well-being. Although significant associations were found, the cross-sectional design limits our ability to establish the direction of these associations and further longitudinal research is needed to determine cause and effect. Firstly, direct personal contact/interactions was significantly associated with a greater decrease in well-being and increase in psychopathology. This finding suggests that those with a higher p-score and lower well-being might have sought direct contact with social support systems to better cope during the pandemic. Alternatively, the reverse may also be true, in that individuals depending on and valuing direct social contact were more deprived of this option during the pandemic. Results from a qualitative study conducted among healthcare workers in South Africa found that being socially isolated was emotionally difficult for those who depended on family and social relationships for support (Rwafa-Ponela et al., 2022).

Secondly, substance use endorsed as a very important coping strategy was significantly associated with a greater decrease in well-being and increase in psychopathology. Likewise, a previous systematic review revealed that substance use during lockdown was linked to increased depression, anxiety, and loneliness (Roberts et al., 2021). The consumption of alcohol or use of substances were also found to be common coping strategies used during the COVID-19 pandemic in other countries (Budimir et al., 2021; Ogueji et al., 2022). Previous

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research suggests that those with greater mental health difficulties use substances to self-medicate psychological distress (Thornton et al., 2012). Alternatively, individuals may have used substances to avoid the negative effects of the pandemic. A previous study found that those who engaged in avoidance coping behaviours during the pandemic were more likely to experience greater distress and poorer well-being (Dawson and Golijani-Moghaddam, 2020). Furthermore, a ban on alcohol sales was implemented in South Africa at various stages in 2020, which led to a significant decrease in alcohol-related deaths (Moultrie et al., 2021). Future research on the impact of banning alcohol sales on mental health and well-being is warranted.

Studying/learning something new was the only coping strategy found to be significantly associated with higher levels of well-being and lower levels of psychopathology. In prior COVID-19 research, keeping busy with activities during lockdown was reported to be a frequent strategy used to cope (Fuller and Huseth-Zosel, 2021; Kar et al., 2021). In a qualitative study conducted in the UK, participants reported that engaging with university work was helpful to remain occupied during lockdown (Ogueji et al., 2022). Engaging in work or studies may be a proactive approach to help individuals accomplish goals, have a sense of purpose and agency, or maintain normalcy in light of the restrictions imposed. Future interventions should focus on promoting positive coping during infection times. Positive coping strategies were found to be protective against anxiety and depression (Fullana et al., 2020) and were linked to posttraumatic growth during the COVID-19 pandemic (Willey et al., 2022).

Financial loss was significantly associated with a greater decrease in well-being and increase in psychopathology, which is consistent with previous research in high and low-income countries (Chatterji et al., 2021; Mojtahedi et al., 2021). A study by Posel and colleagues (2021) found that South African adults who kept their jobs during lockdown experienced significantly lower levels of depression and saw improvements in mental health over time, compared to those who became unemployed. Although unemployment is generally linked to poorer mental health (Paul and Moser, 2009; Picchio and Ubaldi, 2022), this impact may have worsened during COVID-19 due to added stressors like illness, loss of loved ones, and restrictions on movement. Finally, studies have found that government social grants were associated with better mental health outcomes during the pandemic (Chatterji et al., 2021; Posel et al., 2021). This underscores the importance of providing government aid in tandem with mental health interventions to prevent worsening of mental health and well-being during a pandemic.

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Limitations

The current study is not without limitations. Due to the cross-sectional design of the study, conclusions about causality cannot be made. As the majority of the sample were female, White, and university educated, findings cannot be generalized to the broader South African population. Due to the electronic format of the survey, those without access to the internet, such as lower-income groups, were unlikely to be represented in the sample. The survey was administered to various low-income communities by a research nurse, allowing the survey to be slightly more accessible; however, further research is needed on the impact of COVID-19 in lower-socioeconomic communities in South Africa. Furthermore, outcomes were assessed using self-report measures that relied on participants' retrospective recall of the last two weeks before the outbreak, which may be vulnerable to recall bias.

Implications

Findings from the study provide important implications for future research and policy-making decisions. While the current study found a significant deterioration in well-being and mental health from before to during the pandemic, these are likely transient stress responses to a global pandemic and research is needed to determine the long-term impact of the COVID-19 pandemic in South Africa. Future research should assess the role of resilience in improving mental health and well-being outcomes during the pandemic. This information could be used to inform targeted interventions, such as stress-regulation training to build resilience (De Visser et al., 2016), among those who are at heightened risk of worsened outcomes. As suggested by our study, adequate mental health care service delivery and psychosocial support are critical during times of a global crisis. In the future, public health responses need to address the psychological and social impacts alongside the physical impact of a pandemic. National government responses to a global pandemic need to be adapted to consider the needs of vulnerable population groups, and balance public health and safety with existing social issues. Moreover, online Cognitive Behavioral Therapies (CBTs) that promote adaptive coping strategies (e.g., relaxation techniques and engagement in activities) should be implemented to help individuals who are unable to cope effectively in times of crisis. Internet-based CBT has been shown to effectively reduce depression, anxiety, and insomnia (Olthuis et al., 2016; Sijbrandij et al., 2016; Soh et al., 2020), while also minimizing in-person contact and infection risk during a pandemic.

Conclusion

The COVID-19 pandemic adversely impacted the well-being and mental health of South African adults. Various non-modifiable and modifiable factors were associated with

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worsened mental health and well-being, while others were associated with improved outcomes. In future pandemics, government strategies should be directed at reducing the rate of infection without infringing on fundamental human rights to protect groups that are more severely affected.

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Data Availability

Data for this study can be accessed via the following URL: https://osf.io/bqmgf/?view_only=84a0fd383cd54ad886d1ffe805a231

Conflict of Interest:

MS received honoraria/has been a consultant for AbbVie, Angelini, Lundbeck, Otsuka.

CUC has been a consultant and/or advisor to or has received honoraria from: AbbVie, Acadia, Adock Ingram, Alkermes, Allergan, Angelini, Aristo, Biogen, Boehringer-Ingelheim, Bristol-Meyers Squibb, Cardio Diagnostics, Cerevel, CNX Therapeutics, Compass Pathways, Darnitsa, Delpor, Denovo, Gedeon Richter, Hikma, Holmusk, IntraCellular Therapies, Jamjoom Pharma, Janssen/J&J, Karuna, LB Pharma, Lundbeck, MedAvante-ProPhase, MedInCell, Merck, Mindpax, Mitsubishi Tanabe Pharma, Mylan, Neurocrine, Neurelis, Newron, Noven, Novo Nordisk, Otsuka, Pharmabrain, PPD Biotech, Recordati, Relmada, Reviva, Rovi, Sage, Sequirus, SK Life Science, Sumitomo Pharma America, Sunovion, Sun Pharma, Supernus, Tabuk, Takeda, Teva, Tolmar, Vertex, and Viatris. He provided expert testimony for Janssen and Otsuka. He served on a Data Safety Monitoring Board for Compass Pathways, Denovo, Lundbeck, Relmada, Reviva, Rovi, Supernus, and Teva. He has received grant support from Janssen and Takeda. He received royalties from UpToDate and is also a stock option holder of Cardio Diagnostics, Kuleon Biosciences, LB Pharma, Mindpax, and Quantic.

None of the other authors declared any interest.

Author Contributions

- MS, CC, TT, AE and SS conceptualized and designed the study.
- GS contributed to data collection.
- AA analyzed the data and drafted the manuscript.
- SS contributed to supervision.
- All authors reviewed and approved the final manuscript.

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Figure 1

Factor structure of the p-score

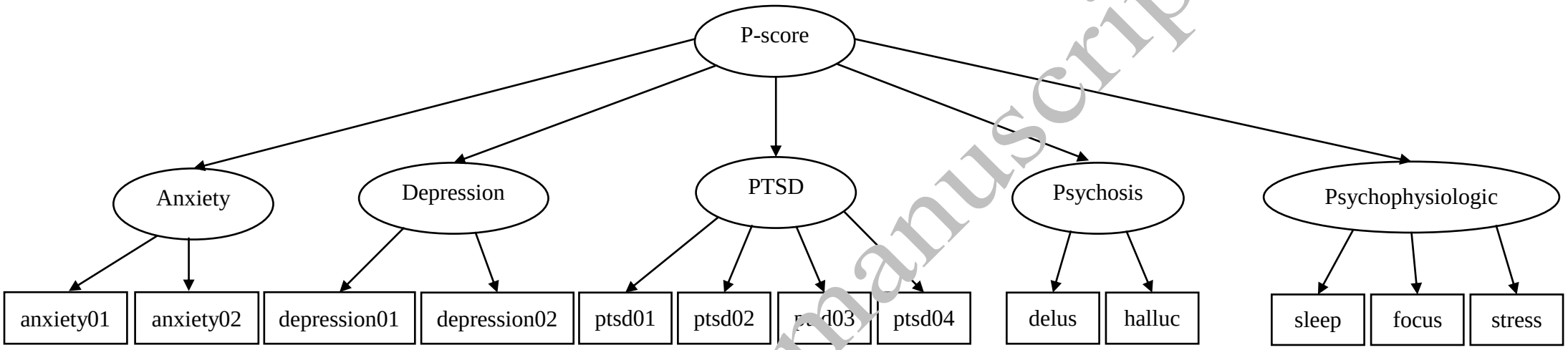

Table 1 *P-score items, descriptions and scoring*

Item	Description	Scoring
Anxiety	Over the last two weeks, how often have you been bothered by any of the following problems:	
anxiety01	Feeling nervous, anxious, or on edge?	0 (never) – 100 (every day)
anxiety02	Not being able to stop or control worrying?	0 (never) – 100 (every day)
Depression	Over the last two weeks, how often have you been bothered by any of the following problems:	
depression01	Little interest or pleasure in doing things?	0 (never) – 100 (every day)
depression02	Feeling down, depressed, or hopeless?	0 (never) – 100 (every day)
PTSD	In the last two weeks, how much have you been bothered by any of the following problems, related to a stressful life experience:	
ptsd01	Repeated disturbing memories, thoughts, or images, or dreams of the stressful experience?	0 (not at all bothered) - 100 (extremely bothered)
ptsd02	Suddenly acting or feeling as if the stressful experience was happening again (as if you were reliving it)?	0 (not at all bothered) - 100 (extremely bothered)
ptsd03	Avoiding thinking about, or talking about, or having feelings related to, or avoiding engaging in activities or situations that remind you of the stressful experience?	0 (not at all bothered) - 100 (extremely bothered)
ptsd04	Being “super alert” or watchful or on guard?	0 (not at all bothered) - 100 (extremely bothered)
Psychosis	In the last two weeks, how much did you experience any of the following:	
delusions	i) believe that you seem to live through events exactly as they happened before (déjà vu), ii) believe that someone is out to get or harm you on purpose, iii) believe that your thoughts or actions are not your own; iv) see special meanings in advertisements, shop windows, or in the way things are arranged around you, v) believe that you have a very important special purpose or mission in life that others can’t understand.?	0 (no symptoms) - 100 (extreme severity)
hallucinations	How much did you hear, see, smell, taste or feel things that others cannot?	0 (no symptoms) -100 (extreme severity)
Psychophysiologic		
sleep	In the last two weeks, how much have you experienced sleep problems (difficulty falling or staying asleep, early morning awakening)?	0 (no symptoms) -100 (extreme severity)
focus	How difficult has it been for you to concentrate or focus, in the last two weeks?	0 (not difficult at all) - 100 (extremely difficult)
stress	How stressed have you felt in the last two weeks?	0 (not stressed at all) - 100 (extremely stressed)

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Table 2 *Sample characteristics*

	n	(%)
Age group		
18-29	510	27.3
30-49	568	30.4
50-69	664	35.6
≥70	124	6.6
Gender[b]	17	
Male	379	20.3
Female	1458	78.1
Non-binary	10	0.5
Transgender/intersex	2	0.1
Race/ethnicity		
White	1411	75.6
African descent	220	11.8
Hispanic	1	0.1
Asian	31	1.7
Mixed	96	5.4
Other	36	2
Prefer not to answer	66	3.5
Marital status[b]	11	
Single (never married)	713	38.2
Married or co-living partner	817	43.8
Widowed	117	6.3
Divorced or separated	209	11.2
Education[b]	3	
None/primary/secondary	524	28.1
College/university degree	1234	66.1
PhD	105	5.6
Employment status[b]	10	
No	968	51.9
Yes	888	47.8
SES[a]	60.9	19.3
Restrictions	2	
No restrictions	59	3.2
Level 1	1272	68.2
Level 2	372	19.9
Level 3	154	8.3
Level 4	7	.4
Urbanicity[b]	2	
Village/rural	104	5.6
Small city/town (10,000-100,000 population)	349	18.7

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Medium city/town (100,000-500,000 population)	415	22.2
Large city/town (over 500,000 population)	996	53.4
Living with a family member[b]	283	
No	239	12.8
Yes	1344	72
Prior medical condition[b]	9	
No	919	49.2
Yes	938	50.3
Prior mental health condition[b]	7	
No	1271	68.1
Yes	588	31.5
Family history of mental illness[b]	3	
No	1080	57.9
Yes	783	42
COVID-19 symptoms[b] [c]	9	
No	1655	88.7
Yes	202	10.8
Childhood adversity		
No	922	49.4
Yes	944	50.6
Adulthood adversity		
No	941	50.4
Yes	925	49.6

Note. Restrictions level 1= recommendations to stay home only, level 2 = sued or fined if leaving home unless necessary, level 3 = arrested if leaving home unless necessary, and level 4 = cannot go out under any circumstances.

[a]Mean and standard deviation

[b]Missing data

[c]Symptoms include fever, cough, shortness of breath, sore throat, fatigue.

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Table 3

Paired samples t-test of the change in well-being and p-score from pre- to during the COVID-19 pandemic

Outcome	Pre-pandemic	During pandemic	Mean difference	*t*(df)	*p*	Cohen's *d*
	M(SD)	*M(SD)*				
Well-being	72.8 (16.9)	53.3 (24.4)	-19.51	-34.93 (1866)	<.001***	.81
P-score	30.4 (17.8)	43.7 (22.3)	13.66	30.48 (1866)	<.001***	.71

*$p < 0.05$, **$p < .01$, ***$p < .001$

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Table 4 *Change in well-being and p-score across sociodemographic groups*

	Well-being difference		P-score difference	
	M (SD)	***p***	***M (SD)***	***p***
Age group		.06		.01
18-29	-18.5 (23.6)		13.4 (17.5)	
30-49	-18.9 (25.8)		12.3 (19.3)	
50-69	-21.3 (23.6)		15.5 (20.3)	
≥70	-16.8 (20.1)		10.7 (18.1)	
Gender		.016		**<.001**
Male	-17.0 (21.3)		10.8 (18.4)	
Female	-20.1 (24.6)		14.4 (19.4)	
Race/ethnicity		.006		**<.001**
White	-20.6 (24)		14.9 (19.5)	
African descent	-14.4 (21.6)		7.4 (15.9)	
Asian	-15.0 (24.2)		13.2 (16.3)	
Mixed	-18.1 (24.9)		11.0 (19.4)	
Other	-21.2 (25.9)		17.9 (20.1)	
Prefer not to answer	-16.7 (31.1)		11.24 (22.5)	
Marital status		092		.252
Single (never married)	-18.5 (23.6)		13.0 (17.9)	
Married or co-living partner	-19.3 (23.9)		13.9 (19.9)	
Widowed	-23.78 (24.4)		16.88 (20.1)	
Divorced or separated	-21.7 (20.5)		13.8 (21.5)	
Education		**<.001**		**<.001**
None/primary/secondary	-21.5 (26.0)		14.4 (20.1)	
College/university degree	-19.4 (23.4)		13.9 (19.3)	
PhD	-11.4 (21.8)		7.4 (15.0)	
Employment status		.595		.894
No	-19.8 (24.4)		13.6 (19.5)	
Yes	-19.2 (23.9)		13.8 (19.3)	
SES	.099[d]	**<.001**	-.031[d]	.200

[d] Pearson correlation coefficient

Bonferroni corrected p=.002

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Table 5 *Change in well-being and p-score across non-modifiable environmental/clinical factors*

	Well-being difference		P-score difference	
	M (SD)	***p***	***M (SD)***	***p***
Restrictions		**.002**		.117
No restrictions	-24.6 (24.4)		14.8 (21.5)	
Level 1	-18.1 (23.5)		13.0 (18.5)	
Level 2	-22.3 (24.9)		14.7 (20.7)	
Level 3	-23.3 (26.1)		16.8 (21.8)	
Urbanicity		.048		.017
Village/rural	-23.5 (23.8)		15.8 (19.9)	
Small city/town	-19.8 (24.5)		12.7 (18.5)	
Medium city/town	-21.4 (26.7)		16.2 (21.0)	
Large city/town	-18.2 (22.8)		12.8 (18.4)	
Living with a family member		.194		.707
No	-21.1 (22.6)		13.1 (18.6)	
Yes	-18.9 (24.5)		13.6 (19.2)	
Prior medical condition		.052		.004
No	-18.5 (23.9)		12.4 (19.0)	
Yes	-20.6 (24.4)		15.0 (19.7)	
Prior mental health condition		**<.001**		**<.001**
No	-18.0 (23.0)		12.2 (18.7)	
Yes	-23.0 (26.1)		16.9 (20.5)	
Family history of mental illness		.010		**<.001**
No	-18.3 (22.5)		12.4 (19.3)	
Yes	-21.3 (26.2)		15.5 (19.4)	
COVID-19 symptoms		.174		.234
No	-19.2 (24.1)		13.5 (19.3)	
Yes	-21.6 (24.5)		15.2 (19.6)	
Childhood adversity		.008		**<.001**
No	-18.0 (23.1)		12.0 (18.5)	
Yes	-21.0 (25.0)		15.3 (20.1)	
Adulthood adversity		**<.001**		**<.001**
No	-16.8 (22.9)		11.4 (18.3)	
Yes	-22.3 (25.0)		16.0 (20.2)	

Bonferroni corrected p=.002

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Table 6 *Change in well-being and p-score across importance levels of coping strategies*

		Well-being difference		P-score difference	
	***n* (%)**	***M (SD)***	***p***	***M (SD)***	***p***
Direct personal contact or interactions			**<.001**		**<.001**
Not important	237 (12.7)	-13.8 (26.0)		8.8 (18.8)	
Somewhat important	638 (34.2)	-16.6 (22.3)		11.3 (17.5)	
Very important	991 (53.1)	-22.8 (24.4)		16.4 (19.4)	
Exercise			.891		.984
Not important	167 (8.9)	-20.0 (23.8)		13.5 (20.4)	
Somewhat important	568 (30.4)	-19.1 (23.0)		12.2 (18.1)	
Very important	1131 (60.6)	-19.6 (24.7)		14.4 (19.4)	
Gaming			.736		.709
Not important	1334 (71.5)	-19.3 (23.5)		13.8 (19.3)	
Somewhat important	324 (17.4)	-19.6 (25.6)		13.7 (19.4)	
Very important	208 (11.1)	-20.7 (25.9)		12.6 (20.1)	
Internet			.070		.346
Not important	68 (3.6)	-14.5 (21.7)		10.5 (16.6)	
Somewhat important	369 (19.8)	-18.0 (24.0)		14.2 (18.7)	
Very important	1429 (76.6)	-20.1 (24.2)		13.7 (19.7)	
Keeping informed about the pandemic			.541		.615
Not important	151 (8.1)	-21.9 (28.1)		14.8 (20.3)	
Somewhat important	810 (43.7)	-19.3 (24.0)		13.9 (19.0)	
Very important	899 (48.2)	-19.3 (23.6)		13.3 (19.6)	
Hobbies			.648		.965
Not important	200 (10.7)	-20.5 (23.0)		13.3 (17.9)	
Somewhat important	660 (35.4)	-19.9 (23.3)		13.7 (19.3)	
Very important	1006 (53.9)	-19.1 (24.9)		13.7 (19.7)	
Spending time with pets			**<.001**		**<.001**
Not important	485 (26.0)	-16.7 (22.2)		10.8 (18.1)	
Somewhat important	380 (20.4)	-17.6 (22.9)		12.7 (19.0)	
Very important	1001 (53.6)	-21.6 (25.3)		15.4 (19.9)	
Media (TV, movies, radio, music)			.535		.940
Not important	171 (9.2)	-21.5 (24.3)		13.5 (18.3)	
Somewhat important	727 (39.0)	-19.4 (23.7)		13.5 (19.0)	
Very important	968 (51.9)	-19.3 (24.4)		13.8 (19.8)	
Social media			.045		.009
Not important	244 (13.1)	-16.3 (25.4)		10.3 (18.7)	

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Somewhat important	735 (39.4)	-19.3 (23.8)		13.6 (19.5)	
Very important	887 (47.5)	-20.6 (24.0)		14.6 (19.3)	
Physical intimacy/sexual activity			.079		.227
Not important	785 (42.1)	-20.6 (24.4)		13.9 (19.4)	
Somewhat important	662 (35.5)	-17.8 (23.1)		12.7 (18.0)	
Very important	419 (22.5)	-20.2 (25.0)		14.7 (21.2)	
Prescribed medication			**<.001**		.0[illegible]
Not important	657 (35.2)	-16.7 (23.2)		11.8 (18.5)	
Somewhat important	343 (18.4)	-19.0 (23.1)		14.3 (20.5)	
Very important	866 (46.4)	-21.9 (24.6)		14.9 (19.5)	
Religion/ meditation/ spirituality			.031		.134
Not important	520 (27.9)	-21.2 (23.7)		14.9 (19.7)	
Somewhat important	523 (28.0)	-20.3 (24.5)		13.9 (18.8)	
Very important	823 (44.1)	-17.9 (24.1)		12.7 (19.5)	
Studying/ learning something new			**<.001**		**<.001**
Not important	425 (22.8)	-24.7 (24.2)		17.1 (19.9)	
Somewhat important	756 (40.5)	-19.0 (23.4)		13.4 (19.4)	
Very important	685 (36.7)	-16.8 (24.4)		11.9 (18.7)	
Substance use (alcohol, tobacco, other)			**<.001**		**<.001**
Not important	160 (32.2)	-16.1 (23.2)		11.2 (18.0)	
Somewhat important	375 (20.1)	-20.0 (21.5)		13.2 (18.6)	
Very important	331 (17.7)	-30.9 (26.5)		22.8 (22.1)	
Work			.817		.979
Not important	351 (18.8)	-20.2 (24.2)		13.9 (21.9)	
Somewhat important	565 (30.3)	-19.5 (23.9)		13.6 (17.8)	
Very important	950 (50.9)	-19.3 (24.3)		13.7 (19.4)	
Other			.037		.004
Not important	820 (43.9)	-18.9 (24.5)		12.7 (19.4)	
Somewhat important	697 (37.4)	-18.7 (23.2)		13.1 (18.2)	
Very important	349 (18.7)	-22.5 (25.0)		17.0 (21.1)	

Bonferroni corrected p=.002

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