



The Role of Personality Risk and Protective Factors in Living with Covid-19: A Longitudinal Study

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Abstract

Earlier research has shown the significant role of personality in serving as risk or protective factors in psychological well-being. However, it is less clear the extent to which personality plays in coping with the Covid-19 pandemic. The aim of the current study was to examine the role of a personality risk factors such as self-criticism, and personality strengths such as efficacy and intrinsic motivation representing resilience in predicting psychological outcomes in response to the Covid-19 pandemic. As part of a broader longitudinal study, personality measures were assessed at ages 23 and 29, and Covid-19-related outcomes were measured at age 41 on a subsample of 83 Israeli participants, who were approached after the first lockdown that was implemented (April 2020). Findings showed that self-criticism measured at age 23 anticipated greater Covid-19-related distress and lower satisfaction at age 41. Decrease in self-criticism from age 23 to 29, which indicates developmental progress toward maturity, explained lower non-adaptive emotional reactions at age 41- lower distress and lower anxiety. In addition, a higher level of intrinsic motivation at age 29 explained a greater likelihood to expect post pandemic growth. Findings highlight the role of personality in addressing unexpected stressful events such as the current Covid-19 pandemic.

Keywords Covid-19 · Personality · Self-criticism · Intrinsic motivation · Longitudinal

Introduction

Since its outbreak, Covid-19 has become a global health issue affecting the lives of millions around the globe. In efforts to control the spread of the virus, many restrictions were imposed: schools and workplaces were closed, social distancing measures were enforced, and social gatherings were prohibited. Though the measures employed aimed at holding the contagion of the pandemic at bay and promoting medical safety, from a psychological perspective, the major changes in life routines have also given rise to exacerbated degrees of uncertainty, ambiguity, loss of control, and severe

economic concerns each of which is known to trigger emotional distress (Shanahan et al., 2022). A comprehensive review of the impact of lock downs during former epidemiological events suggests that the continuous effects of lock downs and restrictions in basic life routines and employment can result in negative psychological effects such as elevated stress, confusion, and anger (Brooks et al., 2020).

Horesh and Brown (2020) noted that although Covid-19 seemed at first as a viral pneumonia, currently it feels like an ongoing “cardiac stress test” on the world’s infrastructures and systems, magnifying functional and structural vulnerabilities as it entails a high level of anticipatory anxiety. Moreover, the interference with individual life plans and increasing threat to economic security further increases the sense of financial uncertainty (Gallagher et al., 2020). As such, Horesh and Brown (2020) contended that Covid-19 involves numerous characteristics that are specific to mass traumatic events and should be viewed from the perspective of trauma. However, despite the massive impact of the pandemic, individuals may respond in different ways. For instance, some may perceive it as more alarming and intimidating than others.

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Indeed, accumulating reports suggest that Covid-19 has proven to be fatal or otherwise result in severe physical deterioration only for a small percentage of the population, many who have tested positive to the virus remain asymptomatic (Li et al., 2020). Similarly, it is likely that the psychological effects of the Corona virus will be relatively minor for many and result only in short-term distress, while others might endure the pandemic as a major stressful and indeed distressing event bearing more severe consequences (Griffin, 2020). Accordingly, the aim of the current study was to understand the risk and protective factors that can explain individual differences in responding to the Covid-19 pandemic.

An existing body of research in health psychology has shown the role of personality and resilience in physical health (Smith, 2006). For example, neuroticism, one of the Big Five Personality Factors, was found to associate significantly with follow-up assessment of health indicators, such as blood pressure and mortality, over extended periods of time, and explained lower health (Turiano et al., 2012). Magee et al. (2013) showed that the personality level of Neuroticism, and its changes over time associated not only with future lower physical health, but also with future lower mental health outcomes.

Accumulating research over the last two years has also started to show the association between personality and coping with the Covid-19 pandemic. Similar to its association with health outcomes, neuroticism explained greater adherence to governmental policy of staying at home (Götz et al., 2021). Neuroticism is a personality trait referring to a tendency to experience a variety of negative emotions, to be pessimistic, and more vulnerable to stress, and explains the greater health precautions such as staying-at-home behavior reported among individuals high on neuroticism (Götz et al., 2021). Greater psychological distress symptoms were also more pronounced for individuals who score higher in neuroticism, possibly due to their greater fear of the pandemic (Aschwanden et al., 2021; Starcevic & Janca, 2022). Following individuals for four months, Ng and Kang (2022) showed that neuroticism was one of the most consistent predictors of social well-being during the pandemic. Earlier higher neuroticism associated with future lower life satisfaction and positive feelings, and higher negative feelings. In contrast, positive personality traits, such as agreeableness and conscientious, explained better adjustment to the crisis (Isterbeke & De Witte, 2022).

The accumulating research has shown the association between personality attributes and individuals differences in responding to the pandemic and, in particular, assessed the association between exposure to Covid-19 and emotional responses such as fear or anxiety or its impact on well-being. Considering the pandemic as a mass traumatic event (Horesh & Brown, 2020), it is also important to examine the extent to which exposure to Covid-19 might result also

in post-traumatic stress symptoms (Brooks et al., 2020) and among whom.

Taken together, we will discuss and examine below personality attributes that might serve as risk factors in the extent to which Covid-19 is perceived and reacted to as a major threat to one's well-being and leads to post traumatic stress or alternatively as a promoter of resilience. In order to better understand how personality attributes might operate in responding to Covid-19, we focus, respectively, on self-criticism as a risk factor, and on sense of efficacy and intrinsic motivation as protective factors that may be in play in such dynamics.

Personality Attributes and Differential Responses to the Covid-19 Pandemic

The Role of Risk Factors

To better understand personality attributes that might explain and predict how individuals encounter and respond to a threatening and uncertain situation such as the pandemic, we incorporate notions from Blatt's theory of personality and psychopathology (Blatt, 2008; Kopala-Sibley & Zuroff, 2014). Blatt's theory focuses on personality characteristics believed to foster or hinder optimal development and well-being throughout the lifespan. Self-definition is central to this study. Adaptive self-definition such as efficacy represents the capacity to maintain a coherent, realistic, and positive sense of self. Furthermore, a high level of efficacy enhances confidence in oneself and, as a result, fosters adaptive functioning. In contrast, maladaptive self-definition, such as high self-criticism, leads to difficulties in functioning and development (Blatt, 2008). High self-criticism is characterized by a preoccupation with achievement and negative appraisals of the self, including guilt and fear when failing to live up to certain standards. High self-criticism is often associated with biased perceptions of self and others, and might lead to misconstruction of events and stressors, thus developing into a risk factor to maladaptive functioning and psychopathology (e.g., Kopala-Sibley & Zuroff, 2014).

Previous research showed that individuals high on self-criticism are more likely to respond with greater distress (e.g., Besser & Priel, 2010; Sherry et al., 2014) to daily hassles, or negative/traumatic life events. Consequently, a higher level of self-criticism can increase the intensity of stress, which in turn can increase negative mood, resulting in adjustment problems and depressive symptoms (Békés et al., 2015). Recently, Besser et al. (2020) showed that a higher level of self-criticism associated with greater loneliness, distress, and negative mood states in response to the Covid-19 pandemic. Applied to the Covid-19 pandemic, it can be postulated that individuals who report high self-criticism

would be more likely to perceive the pandemic as more stressful, as interfering with their efforts to cope with their lives and as consequently leading to greater distress and anxiety. In addition, considering the major impact of the pandemic on life, individuals high on self-criticism might tend to perceive the pandemic more as a major disaster, and be more likely to experience greater post-traumatic stress.

The Role of Protective Factors

Blatt's (2008) personality theory also focuses on "positive" aspects of personality such as high dispositional efficacy and confidence in oneself, which are likely to foster adaptive functioning. Indeed, efficacy, denoting a sense of competence, was found to facilitate goal pursuit as challenges are seen as tasks to be mastered (Locke & Latham, 2002), and was found to predict a higher number of positive events and to perceive events positively (Donnellan et al., 2005).

The Self-determination theory (SDT) further illuminates the antecedents of healthy self-regulation and psychological well-being (Ryan & Deci, 2000). Within this theoretical framework, emphasis is placed on the role of autonomous motivation, which regulates one's behavior and facilitates psychological growth (Shahar et al., 2003). A greater sense of autonomy is achieved when actions are self-initiated or fully self-approved, rather than controlled by external forces that are alien to the self (Ryan, 1993). As such, it is the amount of intrinsic motivation that propels self-determined behavior and fosters adaptive functioning. Integrating Blatt's (2008) personality theory and the Self Determination Theory (Ryan & Deci, 2000), Shahar et al. (2003) contended that successful evolution of a sense of efficacy, and attainment of a sense of confidence in one's competence can promote the initiation of autonomously regulated behavior as described by the Self Determination Theory (p. 478). In turn, being autonomously motivated should enhance one's capacity to pursue goals competently and experience lower levels of stress (Sheldon & Cooper, 2008). Taken together, it is suggested that both being efficacious and becoming intrinsically motivated should facilitate personal growth because challenges are viewed as tasks to be pursued and mastered (Maddux & Volkmann, 2010). Indeed, past research showed that internal resources and motivation coincide with feelings of autonomy and volition in young adults, both of which facilitate the pursuit of appropriate developmental tasks (Dietrich et al., 2013). Recent research conducted within the framework of the Self Determination Theory showed that being intrinsically motivated explained greater adherence to COVID-19 regulations (Morbée et al., 2021), and emphasized the importance of being both competent and autonomous during times of insecurity such as the current pandemic (Vermote et al., 2022). Furthermore, remaining motivated despite the pandemic limitations helped university

students empower themselves and remain optimistic despite the Covid-19 adversities (Rahiem, 2021).

Conceptually, the contribution of self-determination is not limited to better coping with life challenges. Rather, it may also facilitate personal growth (Maddux & Volkmann, 2010) which can be relevant for mode of coping with the Covid-19 pandemic. Conceptualized within the framework the study of trauma Tedeschi and Calhoun (1995, 2004) coined the term *posttraumatic growth* to describe the experience of positive changes that occur as the result of the struggle with major life crises. Out of a severe crisis, a person might find inner strengths that facilitate challenging earlier established assumptions about one's assumptions regarding oneself and the world, and lead to growth despite the experienced adversity (Tedeschi & Calhoun, 2004). The assumption behind the notion of *posttraumatic growth* is that bad experiences might have a greater power than good experiences to lead to change and even to growth (Baumeister, et al, 2001). Taken together, we assume that higher self-efficacy combined with greater intrinsic motivation could serve as a protective factor against the Covid-19 pandemic, and associate with lower stress, higher satisfaction, and lower post-traumatic stress reactions. Furthermore, higher levels of efficacy and intrinsic motivation would not only serve as a buffer against experiencing-related distress but might also be helpful for staying optimistic (Rahiem, 2021), and lead to a tendency to perceive the experiences accompanying the Covid-19 pandemic as a potential for growth (Tedeschi & Calhoun, 2004).

Personality Change and Its Role in Coping with Covid-19 Impacts

Personality traits tend to be fairly stable over time (Caspi et al, 2005). However, in recent years, there is increasing evidence that personality traits might change with age. In a meta-analysis of longitudinal studies, Roberts et al. (2006) demonstrated that while personality changes during the adolescent years, personality continues to change during young adulthood at double the rate of change during adolescence. Research shows that over the years, most individuals gradually became more agreeable and emotionally stable (Roberts & Davis, 2016). Research has also shown that personality change can be conducive for better coping with developmental tasks and well-being. Greater maturity contributes to a more positive and resilient approach to stressors by enhancing active modes of coping and decreasing maladaptive attitudes such as withdrawal or over-focusing on emotions (Connor-Smith & Flachsbart, 2007). Thus, it is reasonable to expect decreases as well in self-criticism and self-doubts during young adulthood. Earlier research indeed showed decreases in self-criticism across emerging adulthood, which explained better future coping with

developmental tasks and psychological well-being (Michaeli et al., 2019, 2020). Thus, it is reasonable to assume that decrease in self-criticism, which enhances individual resilience would, in addition to efficacy, facilitate facing and coping with the Covid-19-related stressors and uncertainty. Of note, in his pioneering conceptual work and later research, Roberts (Roberts & Davis, 2016; Roberts et al., 2006) stated that changes in personality mostly entail decrease in negative emotionality and greater emotional stability. As such, it can be expected that the level self-criticism is likely to decrease over time, but not the level of efficacy.

The Present Study

Several studies have begun assessing the association between personality attributes, and the magnitude of perceived distress living with the Covid-19 pandemic and compliance with governmental restrictions (e.g., Somma et al., 2020). Most earlier studies were cross-sectional (Aschwanden et al., 2021; Besser et al., 2020; Starcevic & Janca, 2022). Adding to this burgeoning body of knowledge, the current study, which has been conducted for over 18 years, contributes a much-needed longitudinal perspective. At earlier waves of the study, personality attributes such as self-criticism, efficacy, and intrinsic motivation were assessed during emerging adulthood, when participants were in their twenties (ages 23 and 29, respectively). Covid-19 and the diseases it causes grew into a pandemic by mid-March 2020 (Füzéki et al., 2021). During, and immediately after the first lockdown that was implemented in Israel (April 2020), participants who were in their early 40 s were approached and their reactions to the Covid-19 pandemic were assessed.

The detrimental effect of self-criticism on individual development and adaptation (Blatt, 2008; Kopala-Sibley & Zuroff, 2014) has been documented in theory and research through biased perceptions of oneself and others, and misconstruction of events and stressors. Extending these notions to understanding the way individuals cope with the pandemic, we first hypothesized that higher levels of self-criticism would explain future perceptions of the Covid-19 pandemic as more distressing, greater anxiety and PTSD symptoms, and lower life satisfaction. In contrast, higher levels of efficacy and intrinsic motivation would explain less future perception of the pandemic as distressing, lower anxiety and PTSD symptoms, and higher life satisfaction. In addition, higher levels of efficacy and intrinsic motivation would explain a greater likelihood to perceive the experiences accompanying the Covid-19 pandemic as a potential for growth.

Considering the expected changes in personality during emerging adulthood, we conversely also anticipated that decreases in level of self-criticism would further explain lower future distress and stress symptoms, lower anxiety, and greater satisfaction with life.

Method

Participants and Procedure

Participants are part of a longitudinal study on the development of emerging adults who have been followed for eighteen years. Participants were recruited when they were enrolled in one of two preparatory academic programs at colleges in central and southern Israel. The vast majority (95.7%) of the sample was unmarried at the outset. The study was approved by the university's Internal Review Board (IRB).

The current study comprised a sample of 130 participants (males = 65, 50%) who were assessed at three points of time. In the first assessment (age 23; M age = 23.15 years, SD = 1.76; year 2003), we reported measures regarding personality; self-criticism; and efficacy. In the second assessment (age 29; M age = 29.39 years, SD = 1.42; year 2009), we reassessed these personality measures, as well as the measure of intrinsic motivation. Lastly, at the third assessment (age 41; M age = 41.74 years, SD = 1.96), we assessed Covid-19-related distress, number of anxiety symptoms, and life satisfaction. In addition, participants reported on their expected post (traumatic) Covid-19 growth. Finally, current demographic data such as current marital status and level of income were also collected. The third assessment took place after the first lockdown that was implemented in Israel (April 2020) and lasted for a couple of months. At the third assessment, participants belonged mostly to the middle class, and almost sixty percent had a college degree.

Of note, all the questionnaires were administered in Hebrew, the native language of the participants. Psychometric properties of the Hebrew version of all the questionnaires have been established in the past as outlined below for each instrument, separately.

We were able to recruit 83 (42 males, 51%) participants for the third assessment—(63.8% of the designated sample). Of note, none of the 83 participants were diagnosed with Covid-19. A series of t tests that compared participants who were and were not retained for the third assessment, on the following measures: levels of self-criticism and efficacy at ages 23 and 29, and measures of intrinsic motivation at age 29 did not reveal any significant differences (Cohen's d (size of the difference) = 0.04–0.20). Of the 83 age 41

participants, 55 were married, five were in long and stable relationships, living together, 13 were single, and ten were divorced.

When comparing those who participated in the age 41 assessment with those who dropped out before the age 41 assessment, a series of independent sample *t* tests revealed no differences on self-criticism at age 29, $t=0.55$, $d=0.16$, $p=0.59$ (retained: $M=-0.70$, $SD=1.07$; dropped out: $M=-0.87$, $SD=1.21$); and no differences in intrinsic motivation at age 29, $t=1.13$, $d=0.07$, $p=0.32$ (retained: $M=4.32$, $SD=0.57$; dropped out: $M=4.37$, $SD=0.53$).

Measures

Predictors

Self-criticism and efficacy At age 23 and 29, participants completed the Depressive Experiences Questionnaire (DEQ) (Blatt et al., 1976). In this study, we refer to the scales of Self-Criticism and Efficacy. Self-Criticism (27-items) taps preoccupation with achievement, inferiority, and guilt in the face of perceived failure to meet standards (e.g., “It is not who you are but what you have accomplished that counts”). Efficacy (eight items) represents personal resilience and inner strength (e.g., “I have many inner resources”). Items were rated from 1 = strongly disagree to 7 = strongly agree. The DEQ was standardized by Blatt et al., (1976, Blatt, 2008) and accordingly, the Self-Criticism and Efficacy scores are presented as a Z score. The DEQ was standardized on an American sample by Blatt et al., (1976, Blatt, 2008) and provides a manual for calculating the standardized scores of the Self-Criticism scale. Accordingly, the Self-Criticism score is presented as a Z score. This scoring system has been applied for international samples as well (see for example, Campos et al., 2018). Psychometric properties of the Hebrew translation of this instrument were reported in Shulman et al. (2009). Cronbach’s alphas for the current sample across the two assessments for both scales were acceptable ($\alpha=0.78$ – 0.84).

Motivational orientation Levels of the different motivations were assessed using the modified version of the Client Motivation for Therapy Scale (Pelletier et al., 1997) designed to measure a person’s motivation based on SDT (Ryan & Deci, 2000). Items were adapted to represent motivational issues relevant in the lives and aspirations of young people. Participants were asked to rate the extent to which each motivation represents the efforts they put in obtaining their goals, for each statement on a five-point scale (1 = incorrect, 5 = highly correct). In the current study the intrinsic motivation (“Because I enjoy what I do”), seven-item subscale was used. Psychometric properties of the Hebrew translation of

this scale were reported in Shulman et al. (2009). Cronbach alpha for the scale was 0.83.

Age 41 Assessment

Participants were asked to report a number of demographic data items relevant for the current study. Based on their relationship status, participants were divided into two groups. Those who were married, and those who were involved in long and stable relationships were considered married–1. Those who were single or divorced were considered non-married–0. Based on their current financial situation and the extent to which their income had changed due to the pandemic, they were classified into three categories considering change in income; (1) decreased, (2) did not change, and (3) increased. These measures were entered as control variables.

Outcome Measures

Anxiety symptoms The six-item anxiety subscale (e.g., “How often did you feel tense during the last month”), taken from the Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983), assessed level of experienced anxiety, and was rated from 0–never to 4–very often. Israeli norms of the Brief Symptom Inventory were reported by Canetti et al. (1994). Cronbach alpha for the anxiety subscale was 0.91.

Peritraumatic Stress Symptoms in Response to Covid-19 were measured via a modified version of the PTSD Checklist (PCL-5) (Weathers et al., 2013). This 20-item self-report measure asks participants to indicate the extent to which they experienced each PTSD symptom, on a five-point Likert scale ranging from 0 (not at all) to 4 (extremely). Items correspond to the newly approved PTSD symptom criteria in the DSM–5 (i.e., “to what extent have you experienced distress when thinking about Covid-19”). The original version was adapted so that the timeframe for experiencing each symptom was changed from “in the past month” to “since the outbreak of the Covid-19 pandemic,” and the index event was the Covid-19 pandemic. Psychometric properties of the Hebrew translation of the PTSD Checklist were reported by Solomon et al. (1993). Internal consistency reliability in this study for the PCL-5 total score was 0.88.

Satisfaction with life Participants completed a seven-item measure assessing life satisfaction with their social relationships and leisure activities—“to what extent have you been satisfied with”—(Zullig et al., 2009). Items were rated on a 1 (not satisfied) to 5 (very satisfied) scale. Psychometric properties of the Hebrew translation of this survey were reported by Shulman et al. (2015). Cronbach’s alpha was 0.88.

Expected traumatic growth An adapted version of The Post-Traumatic Growth Inventory (PTGI; Tedeschi &

Calhoun, 1996) consisting of eight items assessed expected growth following the Covid-19 experience (e.g., “I have learned that I have the capacities to cope with stress”). Statements were rated on a six-point scale (0 = low to 5 = high). Psychometric properties of the Hebrew translation of this inventory were reported by Laufer and Solomon (2006). Cronbach’s alpha was 0.89.

Plan of Analysis

To identify support for the hypothesis that changes in self-criticism would be associated with Covid-19-related outcomes, latent changes of self-criticism were created in a path model (*Mplus*). The latent factor scores were saved and imported into the SPSS analyses outlined below. Of note, the correlation between level of Self-criticism at age 23 and its change (the latent factor score) between ages 23 and 29 is $r=0.00$ suggesting that there is no multicollinearity between the two indices. A higher positive change score indicates increases in self-criticism over time, whereas a higher negative score indicates decreases in self-criticism.

In order to examine the study questions, a series of regression analyses were conducted to assess predictors of age 41 Covid-19-related outcomes. Levels of Self-criticism and Efficacy at age 23, and the change in Self-criticism between ages 23 and 29 (the latent changes score) were entered in the first step. Level of intrinsic motivation at age 29 was entered in the second step. To control possible effects of the current situation, the change in financial income and marital status were entered in the last step. We assumed that a decrease in financial income could adversely affect current psychological well-being, while being married might serve as a protective factor.

Missing data accounted for an average of 14.7% ($Range=0.6\text{--}22.5\%$) of reports for the variables included in this study. Little’s MCAR test indicated that data were missing completely at random, $\chi^2(566)=559.43$, $p=0.58$. Missing data in regression analyses were handled with full information maximum-likelihood estimation (FIML).

Results

First, to identify support for the current study’s preliminary assumption that self-criticism changes throughout young adulthood, we conducted a paired samples t test comparing the mean levels of self-criticism at age 23 and age 29; M age 23 = -0.32 ($SD=1.01$) and M age 29 = -0.69 ($SD=1.07$), $t=5.37$, $p=0.00$. The significant difference on self-criticism between the age 23 and age 29 suggested that the level of self-criticism significantly decreased over time. Of note, comparing mean levels of efficacy at age 23 and age 29 did

Table 1 Means, range, and SDs of the study variables

	N	Range	Mean	SD
1. Self-criticism age 23	130	−3.51–2.65	−.32	1.01
2. Efficacy age 23	130	−3.40–2.90	.15	1.04
3. Decrease in self-criticism between age 23 and age 29	127	−2.44–2.06	0.00	0.86
4. Intrinsic motivation age 29	130	2.20–5.00	4.31	.58
5. Change in income due to covid-19	76	1.00–3.00	2.42	.64
6. Marital status at age 41	82	1.00–2.00	1.66	.48
7. Covid-19 distress	79	1.00–3.05	1.46	.43
8. Anxiety	83	0.33–3.33	1.71	.58
9. Post Covid-19 growth	79	1.00–6.00	3.83	1.19
10. Satisfaction of life	83	1.85–5.00	3.64	.55

not reveal a significant change, M age 23 = 0.14 ($SD=1.04$) and M age 29 = -0.12 ($SD=1.10$), $t=1.30$, $p=0.19$.

In Tables 1 and 2, we report the descriptive statistics and correlations of all variables. As can be seen, level of self-criticism at age 23 associated with future reports on higher Covid-19-related traumatic distress and anxiety. Decrease in self-criticism also significantly associated with higher future Covid-19 traumatic distress and lower future life satisfaction. Interestingly, neither self-criticism nor the change therein over time was associated with future capacity to expect growth following the pandemic. It was a higher level of intrinsic motivation at age 29 that explained greater future expectation to report on post Covid-19 personal growth.

In order to examine the study questions, a series of hierarchical regression analyses were conducted. Results of the regression analyses are presented in Table 3. As can be seen, higher Covid-19-related traumatic stress, as well as lower current general satisfaction with life level at age 41 were significantly explained by a higher level of self-criticism at age 23. In addition, decrease in self-criticism between the ages of 23 and 29 explained lower Covid-19-related traumatic stress and lower anxiety at age 41. Finally, intrinsic motivation explained greater future post-traumatic growth. Participants reporting higher intrinsic motivation at age 29 were more likely to expect growth following the Covid-19 experience. In sum, earlier personality attributes such as self-criticism (and its change over time) and earlier intrinsic motivation significantly explained Covid-19-related psychological outcomes. Furthermore, the contribution of earlier personality attributes to future Covid-19-related psychological outcomes remained significant even after the effects of current financial changes to the pandemic and family status were taken into account. Thus, the effect of personality attributes on responses to the Covid-19 pandemic is above and beyond the psychological outcomes that are due to current risk factors—decrease in financial security, or protective

Table 2 Correlation among all study variables

Variable #	1	2	3	4	5	6	7	8	9	10
1. Self-criticism age 23	1									
2. Efficacy age 23	.12+	1								
3. Decrease in self-criticism between age 23 and age 29	.00	-.16+	1							
4. Intrinsic motivation age 29	-.07	.43***	-.06	1						
5. Change in income due to covid-19	-.07	-.02	-.10	-.03	1					
6. Marital status at age 41	-.19+	.06	-.22+	.15	-.21+	1				
7. Covid-19 distress	.29*	.04	-.25*	-.11	-.10	-.19+	1			
8. Anxiety	.09	-.04	-.31*	-.15	-.10	-.21+	.67***	1		
9. Post Covid-19 growth	-.14	.13	.02	.29*	.18	-.02	-.19+	-.15	1	
10. Satisfaction with life	-.32**	.10	.23+	.25*	.10	.24*	-.49***	-.63***	.40***	1

+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

factors such as being married and probably having family support.

Discussion

The current study examined the extent to which personality risk factors, such as self-criticism reflecting risk, associated with distress and anxiety in response to the Covid-19 pandemic. Additionally, the study examines the role of additional personality attributes, efficacy, and intrinsic motivation representing resilience, in predicting psychological outcomes and possible post-traumatic growth in response to the Covid-19 pandemic. Previous studies have also examined the role of personality attributes in responding to the pandemic. Individuals who scored higher on neuroticism described greater fear of the pandemic, and greater pessimism with regard to the duration of the pandemic and its impact (Aschwanden et al., 2021; Starcevic & Janca, 2022). Besser et al. (2020), employing the measure of self-criticism, also showed that a higher level of self-criticism associated with greater loneliness, distress, and negative mood states in response to the Covid-19 pandemic. Though these studies are informative about the association between a variety of personality attributes and coping with the Covid-19 pandemic, these studies are cross-sectional, which limits inferences about possible causal associations. The current study, in contrast, employed a longitudinal design spanning a period of 18 years.

In addition, in the previous studies, an implicit assumption was that personality attributes stay stable across time. However, in recent years, there is increasing evidence that there are also changes in personality over time, in particular during young adulthood when individuals gradually become more agreeable, emotionally stable and lower in negativity (Roberts & Davis, 2016). Consequently, in the current

study, in addition to assessing the role of earlier level of self-criticism, we also examined the extent to which change in self-criticism between ages 23 and 29 could further explain more adaptive coping with the pandemic.

Indeed, findings of the current study showed that both the initial level of self-criticism and its change over time associated with levels of experienced distress, anxiety, or life satisfaction in response to the pandemic. More importantly, where earlier self-criticism was found to be a risk factor for future greater distress or lower life satisfaction, changes in self-criticism over the years could serve as a protective factor. As participants grew older, their level of self-criticism decreased, reflecting the growing maturity among young adults (Roberts & Davis, 2016). Similarly, becoming less self-critical facilitated a more confident approach toward life and resulted in reporting lower traumatic distress and anxiety despite the inevitable adverse effects of the pandemic.

The adverse impacts of self-criticism on psychological well-being found in the current study correspond to earlier findings, and can explain why and how self-criticism undermine a person's functioning. It was shown that individuals with high self-criticism are more likely to respond to daily aggravations, or negative life events, with greater distress (e.g., Besser & Priel, 2010; Blatt, 2004; Sherry et al, 2014). Consequently, elevated self-criticism can exacerbate the intensity of stress and decrease the sense of well-being that, in turn, can increase negative mood, affect, well-being and life satisfaction and lead to adjustment problems (Békés et al., 2015; Dickson & Shulman, 2016).

Relatedly, there is also some earlier evidence that a decrease in self-criticism over time associates with better future adaptation. Decrease in self-criticism explained a decrease in level of depression (Kopala-Sibley et al, 2016) and associated with greater future achievement of developmental tasks such as career development, and better psychological well-being (Michaeli et al., 2019). The current study

Table 3 Predictors of Covid-19-related psychological outcomes at age 41

	Covid-19 distress				Anxiety			
	β	t	ΔR^2	R^2	β	t	ΔR^2	R^2
Step 1								
Self-criticism age 23	.14	2.47*			.05	.85		
Decrease in self-criticism between age 23 and age 29	-.17	2.97**			.20	3.51**		
Efficacy age 23	.02	.36			-.00	-.06		
				.05**				.04**
Step 2								
Self-criticism age 23	.13	2.36*			.04	.71		
Decrease in self-criticism between age 23 and age 29	-.17	2.94**			-.20	3.47**		
Efficacy age 23	.04	.73			.02	.42		
Intrinsic motivation age 29	-.07	-1.27			-.09	-1.61		
			.00	.05**			.01	.05**
Step 3								
Self-criticism age 23	.11	2.02*			.01	.32		
Decrease in self-criticism between age 23 and age 29	-.13	2.35*			-.16	2.85**		
Efficacy age 23	.04	.73			.02	.42		
Intrinsic motivation age 29	-.06	-1.07			-.08	-1.38		
Change in income due to Covid-19-age 41	-.12	-2.18*			-.13	-2.24*		
Marital status at age 41	-.18	3.07**			-.20	-3.43**		
			.04**	.09**			.05**	.10**
F value	$F = 4.90^{**}$				$F = 4.66^{**}$			
Percentage of explained variance	.09**				.10**			
	Post Covid-19 growth				Satisfactions with life			
	β	t	ΔR^2	R^2	β	t	ΔR^2	R^2
Step 1								
Self-criticism age 23	-.08	-1.35			-.17	-2.57**		
Decrease in self-criticism between age 23 and age 29	.02	.39			.15	-1.50		
Efficacy age 23	.08	1.35			.06	1.65		
				.01				.12**
Step 2								
Self-criticism age 23	-.06	-1.13			-.15	-2.43*		
Decrease in self-criticism between age 23 and age 29	.02	.48			.16	-1.34		
Efficacy age 23	.02	.45			.01	.85		
Intrinsic motivation age 29	.17	2.86**			.14	.99		
			.02**	.04*			.00	.12**
Step 3								
Self-criticism age 23	-.06	-1.04			-.13	-2.34*		
Decrease in self-criticism between age 23 and age 29	.04	.69			.11	-1.91		
Efficacy age 23	.02	.46			.05	.25		
Intrinsic motivation age 29	.18	2.98**			.13	.99		
Change in income due to Covid-19-age 41	.18	3.07**			.13	.96		
Marital status at age 41	-.00	-.50			.21	1.73 +		
			.03**	.07**			.01	.13**
F value	$F = 3.66^{**}$				$F = 6.90^{**}$			
Percentage of explained variance	.07**				.13**			

+ $p < .10$; * $p < .05$; ** $p < .01$

is unique in that it examined the role of self-criticism and its change over time in a particular life context—the Covid-19 pandemic. Considered together, it can be suggested that personality attributes affect not only concurrent coping with daily aggravations, or negative life events (e.g., Besser & Priel, 2010; Blatt, 2004; Sherry et al., 2014) or coping with developmental tasks (Michaeli et al., 2019), they play a role in the mode in which a person will address an unexpected challenge such as the Covid-19 pandemic.

Contrary to our expectation, efficacy signifying dispositional competence and confidence in oneself was not associated with any Covid-19-related psychological outcomes. This non-significant effect of efficacy is not on a par with earlier research suggesting that a sense of efficacy and inner strength associates with greater adaptation (Blatt, 2008). We speculate that under the uncertainty of the pandemic and lockdowns, individuals' sense of efficacy probably decreased and was less likely to serve as a protective factor. However, incorporating notions from the self-determination theory (SDT), which addresses the antecedents of healthy self-regulation and psychological well-being (Ryan & Deci, 2000), allowed us to further understand the ways in which individual capacities might be helpful in addressing the pandemic. As hypothesized, we found that higher intrinsic motivation at age 29 associated with higher future likelihood to expect personal growth as a possible outcome of living through the Covid-19 pandemic. Thus, while the pandemic probably affected individuals' sense of efficacy, having a higher level of inner motivation might, however, still stir individuals to search for, identify and consider strategies that facilitate behavior change as highly relevant in this pandemic (Ryan et al., 2021). Thus, a higher level of inner motivation might be helpful for perceiving the pandemic also as an opportunity for making changes and findings new avenues for self-growth. It is possible that inner motivation operates similarly to a sense of optimism. Being more optimistic can help promote a lower psychological impact of the pandemic, and increase positive beliefs of the capacity to cope with the distress (Puig-Perez et al., 2022). Considering the overall findings of the current study comprehensively could suggest two different possible modes of facing and coping with the pandemic, which might complement one another. Earlier elevated self-criticism associated with greater traumatic distress and lower life satisfaction. Relatedly, decrease in self-criticism served as a protective factor and associated with lesser future experienced distress and anxiety. However, neither earlier level of self-criticism, nor its decrease over time associated with future personal growth. In contrast, intrinsic motivation was the only attribute that explained expected future post-traumatic growth. It might be suggested that self-criticism reflects greater emotional negativity about oneself (Blatt, 2008). In a similar vein, change in personality across time was also described as a decrease in

negative emotionality (Robins & Trzesniewski, 2005). Negative emotionality (or its decrease) is more likely to explain the extent to which events are perceived as negative and distressful and, consequently, whether the individual is satisfied or not with one's life. Intrinsic motivation, in contrast, is rather geared toward action. Sheldon and Cooper (2008) described that self-determined motivational orientations such as intrinsic motivation are important precursors of goal pursuit. Self-determined individuals perceive themselves as autonomous agents with full sense of volition and choice. More importantly, as shown by this study, this inner sense continues to be active under the pandemic uncertainty and leads to searching for, and finding avenues for self-growth. In addition, self-determined individuals remain more optimistic and motivated to succeed and overcome during times of uncertainty (Rahiem, 2021; Vermote et al., 2022).

Conceptually, two modes of addressing and coping with the Covid-19 pandemic can be suggested. The first captures the emotional responses to the pandemic and refers to the magnitude of distress experienced due to the pandemic, and the extent to which a person's satisfaction with life is affected. The second refers to actions an individual might take and lessons a person might learn in order to navigate through the pandemic toward a better future (Tedeschi & Calhoun, 2004).

Although we found impressive longitudinal associations to explain Covid-19-related psychological outcomes, the current study has a number of limitations. First, we were able to recruit only 64.8% of the subjects that participated in the earlier assessments. Though no differences were found on any of the predictive variables between participants who participated or did not participate in the last assessment, a larger sample could have strengthened our results. Secondly, we found that change in self-criticism explained future Covid-19-related psychological outcomes. In line with the Social Investment Theory (Roberts & Wood, 2006), we cannot rule out the possibility that behavioral changes between the ages of 23 and 29 years precipitate changes in personality, and these behavioral changes explained the future Covid-19-related psychological outcomes. It is also important to note that despite the large time lag between assessment of the predictors and the psychological outcomes in response to the pandemic, we still cannot claim causality. Finally, our study was conducted in Israel, a Western country. However, it has been noticed that different countries were differently affected by the pandemic, and fought it with different measures. Thus, it cannot be ruled out that the current findings are associated with some distinctive features of the Israeli society. For example, the Israeli society faces security stressors from time to time. Israelis who have more experienced coping with expected stressors might have reacted differently from other societies to the stress associated with the pandemic. Despite these limitations, this 18-year longitudinal

study further highlights the processes connecting personality attributes and modes of addressing and coping with the Covid-19 pandemic among young adults. In particular, findings of the current study indicate that the role of personality attributes can serve as risk or protective factors when coping with the Covid-19-related stressors.

Our findings indicate two modes of reacting to the pandemic—emotional and behavioral—and their personality antecedents might be relevant for implementing measures to cope with the prolonged pandemic. Self-criticism explained elevated stress and anxiety, whereas decrease in self-criticism served as a protective factor. Assisting individuals to decrease negative self-perceptions might thus be a mode of intervening with the negative emotional correlates of the pandemic. In addition, assisting individuals to strengthen their sense of autonomy and intrinsic motivation could be helpful for stirring individuals to take action, find active ways to overcome the impacts of the pandemic, and even lead to future personal development.

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Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval The study was approved by the university IRB.

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