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Improvise, Adapt, Overcome? The Mental Health and Compliance of Youth During the COVID-19 Pandemic

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Chapter 1

General Introduction

The COVID-19 virus brought a substantial period of stress, disruption, and everchanging circumstances. The global spread of the virus was declared as a pandemic by the World Health Organization (WHO) on March 11, 2020, and lasted for more than three years with May 5, 2023, as official end date (World Health Organization, 2024). Particularly at the start of the pandemic there were many uncertainties and urgent issues that needed to be addressed. This led to people trying to improvise the best they could, to deal with the situation (e.g., working from home or having a fancy dinner at home instead of eating out). During the start of the COVID-19 pandemic, public health organizations were confronted with the question how to reduce the spread of the virus as fast and effective as possible, while others started discussing the potential effects of the measures taken to prevent the virus from spreading on the mental health of the population (both negative and positive) (e.g., Bruining et al., 2021; Cullen et al., 2020; Usher et al., 2020; Sahu, 2020).

After all, research on previous pandemics already indicated that measures like quarantine negatively affected mental health (Brooks et al., 2020; Hawryluck et al., 2004; Huremović, 2019; Loades et al., 2020). Over the course of the COVID-19 pandemic an increasing number of studies on mental health appeared, but the results of these studies were inconsistent. Some studies indicated an increase in mental health problems during the COVID-19 pandemic (Kauhanen et al., 2023; Savage et al., 2020), whereas other studies indicated a decrease in mental health problems (Marmet et al., 2021) or did not find a mental health effect at all (Knowles et al., 2022; Stamatis et al., 2022). There were also studies that found mixed results (e.g., an increase in depression and a decrease in anxiety) (Hawes et al., 2021, Lee et al., 2020, McLafferty et al., 2021, Wieman et al., 2022), or found stronger effects for specific population groups, such as younger people or those with pre-existing mental health problems (O'Connor et al. 2021, Samji et al. 2021; Zijlmans et al., 2023). Younger people seemed to be particularly at risk of developing mental health problems during the pandemic with the imposed governmental measures due to their developmental stage (Branje & Morris, 2021; Orben et al., 2021), although research on specifically late adolescents and young adults (aged 16 - 24 years) was limited. This dissertation focused on the mental health of late adolescents and young adults from the general population during the COVID-19 pandemic.

The COVID-19 Pandemic and Preventive Measures

It is first important to address why the COVID-19 pandemic could have had a negative effect on mental health. First, during the COVID-19 pandemic there was a constant threat of getting infected with the COVID-19 virus or the risk of infecting others. Infection with the COVID-19 pandemic could lead to serious symptoms and even death,

as medication and vaccination were not yet available in the first period of the pandemic. This may have increased stress and anxiety. Additionally, the COVID-19 pandemic was accompanied by many preventive measures, with some being (far) more intrusive than others. One of the main preventive measures was the social distancing measure, in the Netherlands referred to as the '1.5 meter rule', which aimed to reduce the spread of the COVID-19 virus. This measure stated that people had to maintain at least 1.5 meter distance between oneself and any other person who did not belong to the same household. Furthermore, other preventive measures were taken to stop the spread of the virus, such as lockdowns with curfew, stay-at-home measures, and quarantine for those who attracted COVID-19 or showed COVID-like symptoms. All these measures severely limited social interaction, and could therefore be seen as stressors on top of the threat of the COVID-19 virus itself.

Although restricting (real-life) social contact is a very effective measure to limit the spread of viruses (e.g., Matrajt & Leung, 2020; West et al., 2020), social interaction remains important for development and mental health, especially in late adolescence and young adulthood. During these life stages the (social) brain is in development and various cognitive abilities such as self-referential processing and mentalizing improve through social interaction (Dumontheil et al., 2010; Van der Aar et al., 2018). Being deprived of social interaction can increase mental health problems, such as loneliness or depression (Orben et al., 2020). It is therefore plausible that the social distancing measures could have negatively affected the mental health of late adolescents and young adults. Perhaps not surprising, particularly the young people who complied with the preventive measures showed more mental health symptoms such as anxiety and depression (Coulaud et al., 2023; Conway et al., 2023). Furthermore, some late adolescents and young adults seemed to show non-compliance to increase their mental wellbeing (McGuire et al., 2023). Considering the effects compliance has on mental health, it seems important to take compliance into account when examining the potential effects of the COVID-19 pandemic on mental health.

Why focusing on late adolescents and young adults?

Multiple studies indicated that age was associated with mental health problems during the COVID-19 pandemic (e.g., Pieh et al., 2020; Talevi et al., 2020), suggesting that young people experienced more mental health symptoms than people in other (although not all) age groups. Particularly late adolescents and young adults (aged 16-24 years) were assumed to be at risk of developing mental health problems during the pandemic due to their developmental stage (Branje & Morris, 2021; Orben et al., 2020).

In their state of development, engagement in social interaction is pivotal for identity formation. According to Erikson (1968), mastering or resolving eight subsequent "stages of crisis" is an important part of identity development. During the developmental stage of late adolescence and young adulthood two stages need to be dealt with: the fifth stage of "Identity versus Role confusion" and the sixth stage of "Intimacy versus Isolation" (Branje & Koper, 2018), which are both mastered and/or resolved through social interaction with others. During the stage of "Identity versus Role confusion" an individual seeks answers on questions about who they are, who they want to be, and what their place and role in society is, while the stage of "Intimacy versus Isolation" is about seeking love and/or companionship in friendships and romantic relationships, and becoming able to make long-term and reciprocal commitments (Branje & Koper, 2018). If one is hindered in this developmental process and fails to master or resolve the "stages of crisis", the risk for developing mental health problems such as anxiety, depression, and loneliness increases (Branje et al., 2018; Crocetti et al., 2009; Harter et al., 1996; Sandhu et al., 2012).

The imposed preventive (social distancing) measures may have affected mental health also in a different way. According to the Self-Determination Theory (SDT) of Ryan and Deci (1985, 2017), an individual has three basic psychological needs that must be fulfilled to experience well-being, psychological flourishing, and high quality of life. Within SDT, there is a sub-theory called the Basic Psychological Needs Theory (BPNT), which assumes that psychological wellbeing and optimal functioning are based on three basic psychological needs (Baard et al., 2004; Deci & Ryan, 2017; Luyckx et al., 2009; Ryan et al., 2008; Vansteenkiste et al., 2020). These three basic needs are a need for autonomy, a need for competence, and a need for relatedness. If these needs are not met, it can lead to 'need-frustration', which can negatively affect ones (psychological) wellbeing (Niemiec et al., 2006; Ryan et al., 2016, Vandenkerckhove et al., 2020, Vansteenkiste & Ryan, 2013; Vermote et al., 2021). During the COVID-19 pandemic, the need for autonomy could have been constrained by various imposed preventive measures, because they negatively impacted one's freedom of choice. When lockdowns were imposed, people were not able to go where they preferred to go, and they may have felt obligated to stay at home. The need for competence may not have been fulfilled by the closing of schools and other educational institutions, hindering the acquirement of skills and knowledge. Last, the need for relatedness may not have been satisfied due to the social distancing measures. Real-life social interaction was limited, and physically meeting other people became difficult, although digital communication was possible. Given these basic psychological needs that could not be satisfied or were only partly satisfied, it can be reasoned that the COVID-19 pandemic and its preventive measures may have negatively impacted the mental health of late adolescents and young adults.

On the other hand, factors that buffered a potentially negative effect of the pandemic and the preventive measures may have been present. Examples of these factors are the experience of social support (for instance support offered by peers or a (natural) mentor), having adequate coping strategies, and being resilient as perhaps the most important factor (e.g., Demetriou et al., 2021; Flesia et al., 2020; Szkody et al., 2021). Resilience can be described as the dynamic process of positive adaption during and after stressful life circumstances, such as the COVID-19 pandemic (Kalisch et al., 2017). Higher levels of resilience have been associated with fewer mental health problems, and research has suggested that resilience may have buffered against the negative effects of the COVID-19 pandemic (Demetriou, 2021; Ungar & Theron, 2019). Resilience is not only based on one's individual personality and skills, but also on the quality of relations with others (Masten et al., 2021; Raghavan & Sandanapitcha, 2020). As such, empirical evidence has revealed that the availability of a natural mentor (a non-parental adult who is a confidant and advocate for the youth that offers support and guidance) may be beneficial for resilience (Southwick et al., 2007; Van Dam et al., 2018). Research also showed that having a natural mentor was associated with fewer mental health problems (Hagler & Rhodes, 2018; Koper et al., 2022; Van Dam et al., 2018), and may have buffered negative effects of the pandemic. Last, adequate coping strategies can change the impact of stressful life events and crisis situations, such as the pandemic. Studies have revealed that using task-oriented coping to address difficulties such as the COVID-19 pandemic is associated with better mental wellbeing (Budimir et al., 2021; Taylor & Stanton, 2007). This dissertation specifically focused on the potential roles of having a natural mentor, coping strategies, and resilience in the possible relation between the COVID-19 pandemic and mental health problems.

It is evident that the COVID-19 pandemic came with multiple and different stressors, such as the fear of infection and several invasive preventive measures, which could all lead to mental health problems in late adolescents and young adults. On the other hand, young people from the general population may have been sufficiently resilient to cope with these stressors, for instance because they received social support from a natural mentor or other supportive figures, or because they used adequate coping strategies. These factors may have buffered the potential negative effects of the COVID-19 pandemic, and may have led to only small effects on mental health, or even no effects at all. This dissertation aimed to gain more insight into the effect of the COVID-19 pandemic on the mental health of late adolescents and young adults from the general population, and focused on the first year of the pandemic.

Dissertation Outline

This dissertation comprises four studies. Chapter 2 presents the results of a cross-sectional study, which examined factors that were hypothesized to be associated with compliance with the COVID-19 measures, such as social distancing measures. The constructs of interest were mental health problems, coping strategies, resilience, and the availability of a natural mentor.

Chapter 3 presents a qualitative interview study, which aimed to gain insight into the question of what makes late adolescents and young adults comply with the preventive measures. This study was built on two behavioral models, and studied mental health problems, positive outcomes (such as more time for hobbies), and the availability of a natural mentor.

To gain more insight into the effects of the COVID-19 pandemic on the mental health of late adolescents and young adults, a meta-analysis was conducted, which is reported in Chapter 4. This meta-analysis synthesized the available primary evidence on the effect of the COVID-19 pandemic on the mental health of late adolescents and young adults during the first year of the pandemic. In this meta-analytic review, mental health was operationalized in terms of internalizing symptoms, externalizing symptoms, and positive mental health outcomes.

The final longitudinal study examined whether the duration of the COVID-19 pandemic affected the mental health of late adolescents and young adults over the course of the first year of the pandemic. The moderating effect of the severity of the COVID-19 pandemic, operationalized as the severity/intrusiveness of the preventive measures, was examined as well as other factors that could have possibly had an impact, including demographics and resilience. This study is reported in Chapter 5.

Finally, Chapter 6 discusses the results of the above-mentioned studies and presents the overall conclusion of this dissertation. Finally, the strengths and limitations of this dissertation are discussed as well as the implications of the results.

Chapter 2

What makes Dutch youth comply with preventive COVID-19 measures? An explorative study

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Abstract

The measures to contain the spread of COVID-19 are challenging for youth, especially the social isolation measures. These measures are antagonistic to healthy youth development, which requires sufficient social contact with peers and adults. This explorative study examined what factors are associated with adherence to COVID-19 measures in a sample of Dutch youth (N = 263; 79.8% female) with age ranging between 16 and 24 years (M = 21.1 years; SD = 2.44 years), who completed an online questionnaire about their compliance to measures, resilience, coping strategies, mental health, and availability of a natural mentor. Results showed that youth with fewer depressive symptoms adhered better to measures of social distance. Youth who were less suspicious, more resilient, and those with an active coping strategy or a natural mentor more often complied with COVID-19 measures. These results can be used to help youth comply with the COVID-19 measures.

Keywords: Coping, Natural Mentoring, COVID-19, Mental Health, Resilience

Introduction

The COVID-19 virus is spreading around the world, causing great damage to people's health and the economy (World Health Organization, 2020). Therefore, preventive (isolation) measures are used to limit the spread of the virus (Naeem, Irfan, & Javed, 2020), including measures of social distancing, and limiting close face-to-face contact with others. Research shows that these measures have strong potential to reduce the magnitude of the COVID-19 pandemic peak, and reduce the number of infections (Prem et al., 2020). Lowering and flattening the curve of spread is important to reduce acute pressure on the health care system. Premature and sudden lifting of measures can lead to a new peak or even a second or third wave of local or worldwide infections, which is why a gradual phasing out of measures is recommended (Prem et al., 2020). Preventive measures are deemed essential for public health, but also may have adverse social and economic consequences, which are likely to lead to psychosocial and mental health problems, including loneliness, stress, anxiety and depression (Naeem et al., 2020).

Negative behavioral responses (e.g., not staying at home, while having flu-like symptoms) of the population to pandemics can significantly exacerbate the negative impact of the pandemic on public health (Teasdale et al., 2012). On the contrary, positive behavioral responses (e.g., staying at home, while having flu-like symptoms) can limit the negative impact of the pandemic on public health (Teasdale et al., 2012). Both behavioral responses can arise in a pandemic. Therefore, the specific vulnerabilities and protective mechanisms of any population experiencing a pandemic should be investigated (Bruce-Barret et al., 2007). For example, recent global attention for influenza pandemics has focused on governmental restrictions. In view of the developments of COVID-19, it is important for policy and decision-makers of the government and healthcare institutions that scientific evidence about the effectiveness of preventive measures is available, in particular scientific evidence about which factors can increase the effectiveness. In this way, evidence-based guidelines can be developed to increase the effectiveness of (restrictive) preventive measures, while limiting their negative effects (Brooks et al., 2020). Studies show that informing people about the efficacy of preventive measures and trust in the government can lead to better compliance with government rules and recommendations (Bargain & Aminjonov, 2020; Clark et al., 2020; Liao et al., 2010). Better compliance with government rules and recommendations may decrease the number of COVID-19 cases, and therefore limit the negative impact on public health (Teasdale et al., 2012)

A pandemic outbreak affects everyone in society, including youth (Bruce-Barrett, Matlow, Rafman, & Samson, 2007). However, there is little research on the behavior of youth during a pandemic (United Nations, 2021). Some published plans seem to have

skipped some unique considerations pertaining to youth, limiting the pandemic response in its effectiveness (Bruce-Barrett et al., 2007). The current exploratory research examines what is decisive for youth to comply with and/or follow the (restrictive) preventive measures for the spread of COVID-19.

The importance of research on youth behavior in a pandemic outbreak is multifaceted. Research on past pandemics shows that young people react differently, both physically and mentally, from adults during the period of an outbreak (Ragliene, 2016). In addition, the measures imposed by the government to combat a pandemic often have an unpleasant side effect on adults, whereas the consequences for young people are often expected to be more immediate and greater, having an excessive impact on their social life, development opportunities, well-being and physical and mental health (Bruce-Barrett et al., 2007; Koller et al., 2010; Rageliene, 2016). Research on the behavior of youth during a pandemic ensures that measures to combat the current or future outbreak(s) can meet the needs of youth. In addition, research findings can facilitate the successful implementation of (restrictive) preventive measures that target youth, including their compliance with these measures. Moreover, COVID-19 research on youth means that the perspective of youth can be taken into account in governmental health policies, and might be the first step in (active) involvement of youth in the COVID-19 health care policy, which contributes to the realization of their fundamental participation rights (Koller et al., 2010).

Social isolation during the COVID-19 pandemic

What makes that the response of youth can be so different from that of adults? Youth are part of a complex social network that supports their growth, learning and development (Bruce-Barrett et al., 2007), where social contact with peers and adults is essential for their motivation and to develop into a balanced adult person, who is competent and able to independently make the right decisions (Ryan & Deci, 2017). Notably, social change is a characteristic of youth development (Steinberg, 2008). Identity development in youth primarily takes place in relation to other people (Erikson, 1968; Kroger, Martinussen, & Marcia, 2010). The (social) isolation measures youth must comply with to combat COVID-19 are therefore at odds with their developmental challenges of young people growing into adulthood, in which social processes are primary; not only with respect to peers (Rageliene, 2016), but also with regard to adults (Bowers et al., 2015; Kesselring et al., 2016). This is most explicitly reflected in restrictions on being able to attend education in a regular manner, which cannot only lead to a backlog in knowledge and skills (the qualification dimension of education), but which also drastically reduces the possibilities for socialization and personality development through education (Biesta, 2014). A months-long period of social isolation therefore probably has a major impact on

youth (Remie & Veldhuis, 2020). There is also empirical evidence showing that youth do not comply with social distancing measures as much as adults (e.g., Cohen et al., 2020; Park et al., 2020), due to their relatively strong desire for social connections (Mueller et al., 2021). Moreover, they have been shown to have an increased risk for spreading the virus due to their large social networks and frequent encounters with peers and adults (e.g., Andrews et al., 2020; Nivette et al., 2021; Wrzus et al., 2013).

Resilience

The preference for dealing with a pandemic lies in harnessing and strengthening the resilience of the individual and the community (Bruce-Barrett et al., 2007). Resilience is a form of positive adaption, when faced with adversity or significant risk (Masten & Powell, 2003). Resilience is also described as the qualities of both the individual and the individual's environment that enhance positive development (Ungar & Liebenberg, 2011). This also emphasizes the importance of the interaction between the individual and its social environment. Research has shown that resilience is positively related to health-promoting behavior (Naeem et al., 2020). For example, resilient youth could come up with their own ideas to cope with difficulties during a pandemic, which is evident in the following fragment of an interview held with an adolescent: "without a lecture and part-time job my rhythm falls away, then I set my alarm clock myself. That helps enormously to feel good about myself." (Remie & Veldhuis, 2020).

Natural mentoring

Research by Liao et al. (2010) shows that trust in informal information about a pandemic is strongly associated with the perceived health threat and social avoidance. As youth increasingly need autonomy, parents may not be the first and preferred persons to take information from (Van Dam et al., 2018; Zimmer-Gembeck & Collins, 2003). Notably, adolescence is characterized by a decrease in the intensity and frequency of communication between youths and their parents (Keijsers & Poulin, 2013). For youth, the relationship with a "natural mentor", in addition to the relationship with parents, becomes increasingly important (Van Dam et al., 2018). A natural mentor may be a non-parent relative, neighbor, teacher, (adult) friend, or someone from a religious community, who is a confidant and advocate for the youth (Van Dam et al., 2018). They can provide support which can enhance the sense of belonging (e.g., to school, peers or society) of the youth and mattering to significant others (Bowers et al., 2012; Erikson, 1968; Lerner et al., 2009). A mentoring relationship is characterized by a strong connection between an older or more experienced person who provides guidance and support to a younger

or less experienced person (Rhodes, 2002). The connection between an adolescent and "natural mentor" can promote positive youth development and protect against the risks associated with the challenges of adolescence (Bowers et al., 2015). In order to follow the (restrictive) preventive COVID-19 measures, it may help if there is an adult other than your parents whom you can ask for advice and support. Such trusted person may be able to offer an additional perspective on why social distance is useful, and offer support to keep distance (Remie & Veldhuis, 2020).

Coping

Research by Teasdale et al. (2012) shows that coping is a very important, and still insufficiently researched, predictor of human behavior in pandemics. More specifically, it was found that self-experienced competence (i.e., expectations people have about their own skills) was the most important coping mechanism to comply with measures. In general, task-oriented coping is considered to be related to positive adjustment in adolescents (Hampel & Petermann, 2006), which is associated with low levels of anxiety (Taha et al., 2014). This might partly explain why relatively lower levels of anxiety (and depression) proved to be associated with adherence to prevention measures during the initial stage of the 2019 coronavirus disease (Wang et al., 2020). Task-oriented coping is also positively associated with resilience (Campbell-Sills, Cohan & Stein, 2006).

Mental health problems

Not every young person has adequate coping strategies, sufficient resilience, or access to a natural mentor in order to deal with the challenges of the COVID-19 pandemic. For youth with mental health problems the outbreak of a pandemic can aggravate their problems, developing increased levels of anxiety, and depression. The effect of this may be that health-promoting measures, including the COVID-19 measures, will not be followed, because adolescents no longer make an effort to keep themselves healthy (Naeem et al., 2020). Also, youth with mental health problems might experience additional stress from following the preventive measures, worsening their mental health problems (Chatterjee et al., 2020), subsequently creating an extra barrier to obeying rules and preventive measures. Moreover, youth without mental health problems also showed an increase in mental health symptoms during COVID-19 (Pan et al., 2021), possibly having negative consequences for obeying preventive measures too, in particular if mental health symptoms, such as antisocial behavior, emerge (Nivette et al., 2021) or if mental health problems would have a negative effect on self-control (Van Rooij et al., 2020).

Current study

The aim of this study is to find factors that may influence whether youth adhere to COVID-19 (restrictive) preventive measures. First, resilient youth are expected to better adhere to the COVID-19 measures. Second, youth are expected to comply more with measures when they have access to a natural mentor. Third, youth are expected to comply more with measures when they have active (i.e., task-oriented) coping strategies. Finally, it is expected that the absence of psychological problems is positively associated with compliance to the measures.

Methods

Sample

The sample consisted of $N = 263$ youth (80% female) between the ages of 16 and 24 ($M = 21.1$ years; $SD = 2.44$ years). Of the total number of respondents, 96.6% had a Caucasian white background. The vast majority of the respondents attended higher education (83.3%). At the time of the COVID-19 crisis, a total of 71.5% of this group of respondents were still able to follow education (54% online, 17.5% through self-study). Most youth complied with the preventive measures (84,8%), such as washing your hands frequently, and 85.9% followed the rules pertaining to social distancing.

Procedure

The current exploratory study was approved by the ethics committee of the Faculty of Social and Behavioral Sciences of the University of Amsterdam (2020-CDE-12058). Participants were recruited through social media channels, the radio and the website of the University of Amsterdam. Participation in the study was voluntary, and no reward was obtained for participation. Participants could participate in the study using a link which led to the questionnaire. The questionnaire was made and shared using Qualtrics. Participants had 14 days to enroll in the study and finish the questionnaire. The data was gathered during the first wave of the COVID-19 virus outbreak, and the first week of the lockdown.

Instruments

The respondents were asked about their mental health, degree of resilience, and how they cope with stressful situations by means of standardized and validated questionnaires. In addition, questions were asked about demographics (gender, age, education level, nationality), current daily activities (school, study, work), natural

mentoring, and compliance with the (restrictive) preventive measures to combat the COVID-19 virus. The entire questionnaire was in Dutch, using the Dutch translations of the standardized questionnaires.

Symptom Checklist-27 (SCL-27)

Mental health was assessed with the Symptom Checklist-27 (SCL-27), an abbreviated version of the SCL-90-R (Derogatis, 1992). It is a multidimensional screening questionnaire for mental health problems. The SCL-27 contains 27 items, divided over six scales, namely: depressive symptoms, dysthymic symptoms, physical symptoms, symptoms of agoraphobia, symptoms of social phobia and symptoms of distrust. The SCL-27 also contains a global severity index (GSI-27; Hardt, Dragan, & Kappis, 2011). The SCL-27 was validated in a sample of $N = 400$ Polish and German students (Hardt et al., 2011). The reliabilities were generally satisfactory ($\alpha > .70$). In the current study, the 'physical symptoms' scale had the lowest reliability ($\alpha = .74$), while the highest reliability was found for the 'symptoms of social phobia' scale ($\alpha = .83$).

Child and Youth Resilience Measure-12 (CYRM-12)

Resilience was assessed using the Child and Youth Resilience Measure-12 (CYRM-12), an abbreviated version of the CYRM-28 (Liebenberg, Ungar, & LeBlanc, 2013). The CYRM-12 contains 12 items (3 scales) that measure individual capabilities/ resources, relationships with primary care givers, and contextual factors that facilitate a sense of belonging. The study by Koning et al. (2025) established validity and reliability of the Dutch translation of the Child Youth and Resilience Measure (CYRM-12). Internal structure, reliability, concurrent validity and measurement invariance for gender and education level were examined in a sample of mainly Dutch Caucasian white adolescents ($N = 763$). Reliability was satisfactory ($\alpha = .77$). The high negative association between resilience (CYRM-12) and psychopathology (SCL-90-R) was considered indicative of criterion validity. The results of this study imply that the CYRM-12 is a reliable and valid instrument for measuring resilience among Dutch adolescents and young adults. In the present study, Cronbach's alpha was .80.

Coping Inventory for Stressful Situations-21 (CISS-21)

Coping strategy was assessed using the Coping Inventory for Stressful Situations-21 (CISS-21), an abbreviated version of the CISS (Endler & Parker, 1999). This questionnaire measures coping strategy in terms of emotion-oriented, task-oriented and avoidance

coping. The CISS-21 is a valid and reliable instrument to assess coping strategies in adolescents from Turkey and India (Boysan, 2012; Golpelwar 2014). The reliability was acceptable for all subscales in both of these studies (α > .70). The scales 'task-oriented coping' (α = .77) and 'emotion-oriented coping' (α = .83) showed good reliabilities in the current study; In contrast, 'avoidance coping' showed sufficient reliability (α = .62).

Natural mentoring

A total of eight questions were asked to assess the availability of a natural mentor, and the quality of relationship with this person. Some examples of items were: 'In addition to your parents, do you have someone you trust, and who you turn to for advice?' If so, who is this person? (e.g., a friend, family member, sports coach, etc.)'. 'How would you rate the bond with this person (very weak; weak; moderate; strong; very strong)'.

Preventive COVID-19 measures

Respondents were asked about the extent to which they followed the (restrictive) preventive measures to combat COVID-19 on a 5-point Likert scale ranging from 'not at all' to 'completely'. A principal component analysis, with a forced one-factor solution, yielded a reliable scale (9 items, Cronbach's α = .66), which explained 29% of the variance: 'I Cough/sneeze on the inside of the elbow' had the lowest factor loading (.35), and 'I keep a minimum distance of five feet from other people' had the highest factor loading (.67). We found support for a reliable 'social distance' subscale (4 items; Cronbach's α = .67) in a principal component analysis, with a forced one-factor solution, explaining 51% of the variance. The item 'I stay at home as much as possible' showed the highest factor loading (.65), followed by 'I avoid social gatherings' (.55), 'If I experienced complaints, I would stay at home and don't go out ' (.43), and 'I keep at least five feet away from other people' (.41).

Analyses

First, preliminary analyses were performed in SPSS (Statistical Package for Social Scientists, version 24) to examine the correlations between resilience, natural mentorship, coping and psychological problems. Subsequently, it was investigated which correlations exist between resilience, natural mentorship, coping and psychological problems on the one hand and compliance with the COVID-19 measures on the other hand. If there was clarity about the direction of associations, correlations were tested one-sided. Finally, a multiple regression analysis was performed to determine which factors were unique

predictors of adherence to the measures, controlling for both sex and age as well as possible moderation effects by testing the interactions between sex/age and all significant predictors after standardization of the continuous variables.

Results

Table 1 shows the results of the preliminary analysis, where we analyzed the correlations between psychological complaints (outcome measure) and the predictors resilience, natural mentorship, and coping. Only 'avoidance coping' showed no significant correlation with psychological complaints (r = -.063, ns). 'Resilience' (r = -.581, p <.001) and 'emotion-focused coping' (r = .619, p <.001) showed strong correlations with psychological symptoms. Greater resilience proved to be associated with fewer psychological symptoms. Adolescents with an emotion-oriented coping strategy experienced more psychological symptoms. Weak negative correlations were found for the presence of a natural mentor (r = -.157, p <.001), quality of the relationship with the natural mentor (r = -.147, p <.001) and task-oriented coping (r = -.278, p <.001), which indicated that the presence of a natural mentor, a higher quality of the relationship with this mentor and task-oriented coping were related to fewer psychological symptoms.

Table 1

Correlations between the Predictors Resilience, Natural Mentorship, and Coping and the Outcome Measure Psychological Complaints

Predictors	**Pearson correlation (*r*)**	**Significance (*p*)**
Resilience	-.58	<.001
Presence natural mentor	-.16	.006
Quality relationship natural mentor	-.15	.010
Task-oriented coping	-.28	<.001
Emotion-oriented coping	.62	<.001
Avoidance coping	-.06	.153

Note. N = 263.

Table 2 shows the correlations between natural mentorship, resilience, coping, psychological symptoms on the one hand and adherence to the measures, including in particular maintaining social distance, on the other hand. Both general compliance with COVID-19 measures as well as compliance with specifically social distancing measures were examined. Psychological symptoms were found to be negatively related at trend level to following the COVID-19 measures (r = -.080, p <.10) and maintaining social distance (r = -.081, p <.10), which indicated adolescents with psychological symptoms adhered less

to the COVID-19 measures. Depressive symptoms (r = -.101, p <.10 and r = -122, p <.05) and distrust (r = -.135 and -.151, p <.05) were significantly and negatively associated with adhering to measures and maintaining social distance (the relation between depression and adherence to measures at trend level).

Resilience was found to be significantly and positively associated with adherence to measures (r = .237, p <.001) and maintaining social distance in particular (r = .184, p <.001). This implies that greater resilience was related to compliance with COVID-19 measures and maintaining social distance. Natural mentorship turned out to be positively associated with adherence to measures (r = .177, p <.01) and maintaining social distance (r = .197, p <.001). Notably, also quality of the relationship with the natural mentor was positively associated with adherence to measures (r = .117, p <.05) and maintaining social distance (r = .122, p <.05). Task-oriented coping proved to be significantly associated with adherence to measures (r = .154, p <.05) and just failed to reach significance with maintaining social distance (r = .081, p <.10).

Table 2

The Relation between Predictors and COVID-19 Measures

Predictors	**Measures**		**Social Distancing**	
	r	***p***	***r***	***p***
Total psychological symptoms	-.08	.099	-.08	.096
Depressive symptoms	-.10	.052	-.12	.024
Dysthymic symptoms	-.06	.171	-.03	.317
Somatic symptoms	-.05	.209	-.04	.245
Agoraphobic symptoms	.02	.353	.02	.377
Social phobia symptoms	-.07	.131	-.08	.114
Distrust	-.14	.015	-.15	.007
Resilience	.24	<.001	.18	.001
Presence of a natural mentor	.18	.002	.20	.001
Quality relationship natural mentor	.12	.032	.12	.027
Task-oriented coping	.15	.006	.08	.094
Emotion-oriented coping	-.04	.253	-.01	.443
Avoidance coping	-.05	.220	-.06	.150

Note. N = 263. The COVID-19 measures have been separated into two measures: COVID-19 measures in total (column Measures) and a subscale of social distancing measures (column Social Distancing).

In summary, the (trend) significant correlations between the different predictors of compliance with the COVID-19 measures, including maintaining social distance, were weak to very weak.

Finally, a multiple regression analysis was performed on all significant predictors of COVID-19 measures, which yielded a significant regression equation: F (6, 243), 3.474, p = .003, R^2 = .281, with resilience as unique predictor (β = .188, t = 2,242, p = .026). In addition, the regression equation for social distancing was also significant: F (6, 243), 2.715, p = .014, R^2 = .251, with natural mentorship as a unique predictor (β = .147, t = 2,228, p = .027). We did not find significant moderator effects (results are available upon request).

Discussion

The purpose of this study was to examine factors that contribute to adherence to the COVID-19 measures in youth. Youth who comply with the social distance measures have fewer depressive symptoms, are less suspicious of others, are more resilient, more often have a natural mentor, and deal with their problems in a more active way. These factors were not moderated by age and gender. In total, 84.8% of the respondents did adhere to the measures and 85.9% followed the rules pertaining to social isolation. These high percentages may point to a ceiling effect, which may partly explain why the identified associations were relatively weak.

The weak associations found in this study do not make the results less important, as the success of policies to contain the virus outbreak depends on the degree to which everyone adheres to the measures. After all, with a high reproduction number (R, i.e., the number of people that one infected person will pass on a virus to, on average), specific small groups of people who ignore the measures can cause major problems. The reproduction number depends not only on the characteristics of the virus, but also on the characteristics of the population, including factors that determine whether or not people adhere to the preventive measures (Van Loon, 2020).

Based on the results of this study, some recommendations can be made for the government's prevention policy for reducing the spread of COVID-19. Firstly, it is important to offer youth sufficient and understandable information about COVID-19, taking into account that mistrust may interfere with governmental campaigns aimed at guiding a population towards the desired behavior (Liao et al., 2010; Nivette et al. 2021). This effect may be related to epistemic trust, that is, the willingness to consider information as trustworthy and relevant. Epistemic trust increases when the informant is an acquaintance or someone relatively close to the children and adolescents (Eaves & Shafto, 2016). In this case, information provided by the government may only be considered relevant when important persons in the lives of the young people, such as their parents or natural mentors, encourage adherence to the COVID-19 measures (Liao et al., 2010). Besides providing

sufficient and understandable information, governments should take into account the messenger: who delivers the information and how can governments collaborate with people trusted by youth? We recommend that the government encourages natural mentors to keep in touch with youth during a pandemic and supports them in coping with the challenges of a pandemic. When youth experience mental health problems that make them unable to get their lives on track during a pandemic, which may also make it difficult to adhere to preventive measures, they can be encouraged to actively select a natural mentor from their social environment through the youth initiated mentoring program, showing promising results in a recent meta-analysis (Van Dam et al., 2021)Research by Zhong et al. (2020) shows that more knowledge about COVID-19 is associated with a lower chance of negative attitudes and inappropriate behavior. This suggests that health education programs aimed at improving COVID-19 knowledge may be useful in fostering and maintaining safe practices. Our study results indicate that a precondition is that youth have the coping skills and resilience to deal with the COVID-19 problems, and adhere to the measures.

Research shows that it is crucial to take cultural and socio-economic factors into account when designing interventions to promote resilience in times of crisis, because the resilience of citizens is inextricably linked to the resilience of their community, in particular the community's ability to care for its most vulnerable members (Ungar, 2011). In this sense it seems important that youth policy during the COVID-19 crisis focuses on strengthening social support, whereby cultural aspects and socio-economic factors are included in the design and implementation of preventive COVID-19 measures.

It is important to offer support to youth with psychological complaints during the COVID-19 pandemic (and afterwards), since our study showed that measures were followed less often by youth suffering from psychological complaints. However, it should be noted that the sample of our study mainly comprised Caucasian and female youth attending higher education. From previous research it is known that female gender and attending higher education is associated with more compliance with preventive measures during a pandemic (Bish & Michie, 2010), including the COVID-19 crisis (Brouard et al., 2020). In light of this knowledge, our sample was representative of the population of youth to a limited extent.

Research shows that youth are at greater risk for psychological complaints as a result of a pandemic outbreak (Sim et al., 2010). Many adolescents suffer from severe loneliness, which can have negative consequences for their (mental) health, general well-being, and development (Landman, 2020). Especially adolescents with depression and anxiety tend to suffer from loneliness (Blanco, 2020). A negative spiral could easily arise between an increase in psychological complaints and compliance with measures. Results of the current study suggests that especially depressive symptoms require attention.

Adjustments are necessary for youth with psychological complaints. First, it is important to understand the emotional responses resulting from a pandemic, such as anxiety, depression, physical complaints, and loss of control. Second, it is important that youth have timely access to practical information about the outbreak of the virus in order to reduce uncertainty. Third, it is important that social support networks be established or strengthened within society, especially for juveniles who do not single-handedly develop an adequate coping strategy and lack resilience (Sim et al., 2010).

When interpreting the results, a number of limitations of this study should be taken into account. Firstly, the sample is not entirely representative for Dutch youth, as it was a sample of convenience, which contains an overrepresentation of female respondents from Dutch origin with a high level of education. Therefore, the results cannot be safely generalized to youth with a low educational level and migration background. Secondly, in addition to well-validated instruments (SCL-27, CYRM-12, CISS-21), we used questionnaires that were especially developed for this study, in particular to assess compliance with COVID-19 measures. Although their validity is unknown, the reliability of these questionnaires was sufficient. It should also be taken into account that this study was cross-sectional. Therefore, no statements about causal relations can be made. Lastly, given the exploratory nature of our study, and in order to maintain adequate statistical power to identify weaker associations, it was decided not to perform a correction for repeated testing.

Future research should focus on factors that predict compliance of youth with measures that can prevent a (further) virus spread in a pandemic outbreak in the long term, in particular because the success of these measures depends on the vast majority of youth that adhere to these measures. Notably, the longer the preventive measures must be adhered to, the less youth may be willing to comply with these measures due to their intrusiveness and possible negative effects on well-being and mental health. Therefore, future research should focus on the effects of these preventive measures on mental health, especially over an extended period of time. Finally, our study not only reveals how well Dutch youth comply with the preventive COVID-19 measures, but also what factors contribute to compliance to these measures. It would be interesting to replicate our study during a potential subsequent COVID-19 wave or in other countries to establish whether our results are generalizable across time and place.

In view of the exponential growth of the COVID-19 virus spread, the present study examined factors that were assumed to be related to compliance with the preventive measures. The results of our study may be used to support youth in dealing with the COVID-19 crisis and shed light on what youth need to comply with the preventive measures. Youth with fewer depressive symptoms adhered better to measures of social

distance. In addition, adolescents who were less suspicious and more resilient, as well as youth with an active coping strategy and those with a natural mentor more often complied with COVID-19 measures, independent of age and gender.

Chapter 3

Why most youth comply with the social distancing measures: A qualitative study

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Abstract

Aim: To examine what makes youth comply with COVID-19 social distancing measures. *Subject and Methods:* This qualitative interview study explored to what extent and why Dutch youth comply with social distancing measures during the first wave of COVID-19. All 35 participants were between 16 and 25 years old. *Results:* Results showed that participants complied very well with social distancing measures, and that feeling solidarity with others and feeling responsible for others were most important for compliance. The participants experienced mental health issues during the COVID-19 pandemic, but also mentioned positive outcomes, such as more time for hobbies. Lastly, having a natural mentor seems to be positively associated with compliance. *Conclusion:* Most youth complied with the COVID-19 measures, but the participants also discussed the impact on their mental health of the COVID-19 pandemic. These results shed light on the reasons for compliance of youth, but also stress that the mental health of youth should be monitored when these measures are in place.

Keywords: Social distancing, Youth, Compliance, Mental Health, Natural Mentoring, COVID-19 pandemic

Introduction

At the time of writing, COVID-19 has held the world in its grasp for more than three years. With over 761 million cases and over 6.8 million deaths (World Health Organization 2023a), governments all over the world have taken measures to prevent the Coronavirus from spreading, such as social or physical distancing measures. Overall, adults show a high level of self-reported compliance to COVID-19 mitigation measures globally (Van Rooij et al. 2020; Wang et al. 2021). However, youths are known to show less compliance with public health measures, and social distancing measures in particular (Barari et al. 2020; Cohen et al. 2020; Park et al. 2020). Less is known about what motivated youth (defined here as 16 to 25 years old) to comply or not to comply with social distancing measures during the COVID-19 pandemic. Research is needed to better understand what makes youth comply (or not), and how governments can stimulate them to comply to reduce the spread of the Coronavirus. Reducing the spread of the Coronavirus is essential to protect those who are vulnerable or whose health is at risk.

There is limited empirical evidence about the factors that play a role in affecting compliance with behavioral measures in pandemics, especially for youth aged 16 to 25 years. The Health Belief Model (HBM) offers a starting point, describing factors that can initially induce people to adopt preventive health behavior. This is a widely used conceptual framework to explain changes to health-related behaviors and to inform interventions to change health behaviors. The HBM was developed in the 1950s to explain why people hardly participated in programs to prevent and detect diseases and was inspired by Cognitive Theory (Champion and Skinner 2008; Skinner et al. 2015).

The HBM consists of several constructs that predict whether and why someone will take action to prevent, detect, or control illness. These include perceived threat, perceived benefits, perceived barriers to engage in a behavior, self-efficacy, and cues to action (e.g., advice from others). The HBM can be applied to behaviors that reduce the risk of contracting an infectious disease (such as COVID-19). The first construct, ‘perceived threat’, is a combination of perceived susceptibility (the belief of how likely it is to become infected) and perceived severity (the belief about how serious contracting a disease is). The second construct, ‘perceived benefits’, can be explained as a belief about the positive outcomes or advantages of a recommended action to reduce the threat of a disease. This includes outcome efficacy, which refers to the belief about to what extent a particular behavior leads to a certain outcome. The third construct, ‘perceived barriers’, are beliefs about how possible obstacles to taking action can hinder engagement in health behavior. The fourth construct, ‘self-efficacy’, refers to the belief that one can successfully execute health behavior. Lastly, the construct ‘cues to action’ can be explained as internal or external cues that can trigger health behavior.

Perceived threat, benefits, barriers, and self-efficacy all concern health beliefs that may affect health behavior. These beliefs are influenced by sociodemographic (e.g., age, gender, ethnicity, education) and socioeconomic (e.g., insurance status) factors (Skinner et al. 2015). Cues to action may have a direct effect on health behavior or an indirect effect by influencing health beliefs (Skinner et al. 2015). A study by Clark et al. (2020) shows that outcome benefits (e.g., believing that following preventive measures helps to prevent the spread of the Coronavirus) are important for compliance to COVID-19 measures for (young) adults.

The mitigation measures that were put in place all over the world to prevent further transmission of COVID-19 (e.g., social distancing) applied for a substantial amount of time. These long-term mitigation measures can be seen as a chronic or maintenance stage of a crisis (Abdalla et al. 2021). The constantly changing mitigation measures (e.g., curfew) that are not long-term, but are only in place for a shorter period of time can be seen as an acute stage (Abdalla et al. 2021). The two stages are not separate, but exist next to each other. New additions to the acute mitigation stage may occur because of changing circumstances, such as an increase in infection rates, new virus variants, or a change in preventive measures, whereas the maintenance stage (in which measures as social distancing are maintained) remains for a longer period of time. Therefore, it would be useful to examine the maintenance of behavior change in addition to the HBM construct (Kwasnicka et al. 2016).

The maintenance of behavior change can be defined as "the continuous performance of a behavior following an initial intentional change at a level that significantly differs from the baseline performance in the intended direction" (Kwasnicka et al. 2016, p. 280). Theoretical explanations for the maintenance of behavior change in relation to health-related behaviors include maintenance motives, self-regulation, habits, resources, and contextual (environment and social) influences. These factors are related to each other (Kwasnicka et al. 2016).

The first factor, 'maintenance motives', can be explained as motives that enable regular gratification of new behavior. Examples of such motives are those focused on behavior enjoyment, the satisfaction with behavior outcomes, or the congruence of new behavior with someone's identity, beliefs and values. 'Self-regulation' refers to a person's efforts to monitor and regulate their new health behavior while simultaneously inhibiting dominant and automatic behavior, urges, emotions, or desires that may threaten the newly adopted behavior. The factor 'habits' refers to automatically triggered actions performed without conscious awareness. Habits develop after a period of successfully self-regulating new behavior. The fourth factor, 'resources', includes physical and psychological assets that can be relied on during the process of behavioral regulation. When resources are

limited or depleted (e.g., due to mental health issues), this can hinder one's self-regulatory capacities. Lastly, the factor 'environmental and social influences' can be explained as features of the social and environmental context of action which can either facilitate or hinder the maintenance of new behavior over time (e.g., social support, social identity, social norms, environmental changes) (Kwasnicka et al. 2016).

With respect to the latter two factors, several studies have been performed during the COVID-19 pandemic. Although youth have lower risk of serious COVID-19 illness compared to adults (older people and those with underlying medical conditions are more likely to develop serious illness) (World Health Organization, 2023b), the pandemic is taking a toll on youth mental health (Courtney et al. 2020, Khan et al. 2020). There have been multiple reports of increased mental health challenges for youth during the ongoing COVID-19 pandemic (such as depression, anxiety, suicide, and stress) (Loades et al. 2020; Moreira et al. 2020; O'Connor et al. 2021). The negative effect of the COVID-19 pandemic on mental health seems to be stronger for (older) youth than for adults (O'Connor et al. 2021; Samji et al. 2021).

While youth have mostly reported negative effects of the COVID-19 pandemic on their mental health, some have also reported positive outcomes (e.g., greater appreciation of the things they had taken for granted) (Cleofas 2020). While negative effects on mental health are in themselves worrying outcomes, it is possible that worse mental health might influence compliance with social distancing measures as well. An individual's effort to actively control behavior (self-regulation) depends on their personal resources as well as other factors. Someone's self-regulatory capacity is, for example, limited when their personal resources are limited or depleted due to stress or tiredness (Kwasnicka et al. 2016). Mental health is one example of a personal resource. This suggests that a decrease in personal resources (e.g., worse mental health) may lead to less compliance. This was found in a study by Koning et al. (2021), which found that youth with fewer mental health symptoms showed better compliance with social distancing measures. This is in line with results of Nivette et al. (2021), who found that youth with 'anti-social potential' were less compliant. In contrast, a different study found that anxiety towards COVID-19 resulted in more compliance with preventive measures (Harper et al. 2020). These results suggest that there might be a difference between internalizing and externalizing symptoms in terms of effects on compliance with preventive COVID-19 (i.e., pandemic) measures.

Other factors, such as the environmental and social context, may influence both conscious as well as automatic behavior, by either facilitating or hindering behavior change maintenance (Kwasnicka et al. 2016). An example of a social context factor can be found in natural mentoring. A natural mentor may be a non-parent relative, neighbor, teacher, (adult) friend, or someone from a religious community, who is a confidant and

advocate for youth (Van Dam et al. 2018). They can provide support, give advice, or be a role model for youth (Spencer et al. 2016). Having access to a natural mentor might help youth comply with the preventive measures, because their natural mentor complies him- or herself (role model) or because their natural mentor advises youth to comply (norm setting). In line with the theory on maintenance of behavioral change, Koning et al. (2021) found that having a natural mentor might have a positive effect on compliance with social distancing measures. Additionally, support from a natural mentor can help overcome the difficulties of the COVID-19 pandemic, and help to ensure better or good mental wellbeing (Hagler and Rhodes 2018).

Current Study

Knowledge on which factors might contribute to better youth compliance with preventive measures can inform government interventions to increase compliance among this specific target group, and so might contribute to less spreading of the Coronavirus and fewer COVID-19 infections. The current explorative interview study will combine the above-described behavioral models (HBM and maintenance of behavior change) to obtain a more complete view of the factors affecting youth compliance with the preventive COVID-19 social distancing measures in the Netherlands, and to consider whether the models are sufficient or might need to be expanded. The aim of this qualitative interview study is to explore which factors enable or encourage youth to comply with the preventive COVID-19 social distancing measures, more specifically the 1.5 meter social distancing rule. Various factors within the behavioral models will be explored, in particular mental health issues and natural mentorship.

In sum, the following research question is addressed: Which factors influence the compliance of youth with social distancing measures in the Netherlands? The sub-questions are: How well do youth comply with the 1.5 meter social distancing rule? Which factors from the behavioral models play a part in the compliance of youth with this rule? How do youth mental health issues and natural mentorship influence youth compliance with the 1.5 meter rule?

Methods

Sample

The sample consisted of 35 youth that were between 16 and 25 years old (M = 19.6, SD = 2.86) and who lived in the Netherlands. Participants were included from every state of the Netherlands. Eighteen youth were male, seventeen were female. Of those 35

participants, 31 were Dutch, one was Syrian, one was Somalian, one was Sudanese, and one was Gambian. Twenty-eight participants followed or finished vocational education and seven participants followed or finished academic education. Of the 35 participants, 18 lived with their parents, three lived alone, three lived together with their partner, four lived in student housing, four lived in an assisted living facility, two were homeless, and one participant lived in a mother-child institution.

Procedure

This interview study was approved by the ethics committee of the faculty of Social and Behavioral Sciences of the University of Amsterdam (2020-CDE-12362). The participants were recruited through purposive sampling. The youth had to be between 16 and 25 years old. To achieve a heterogenous sample, we aimed to include both youth from vocational and academic education, and to have an even distribution of sex. To include other valuable data, urban and disadvantaged youth were also included, as they usually do not participate in studies. This was done in a collaboration between the National Institute of Public Health and Environment (RIVM) (access to a large pool of youth from the Netherlands) and the University of Amsterdam (access to urban and disadvantaged youth) to achieve a representational sample. The aim was to include 35 participants, 20 participants by the RIVM and 15 participants by the University of Amsterdam. The participants were interviewed between May 30th 2020 and June 10th 2020, during the COVID-19 crisis. From June 1st 2020 the government of the Netherlands announced that restaurants, cafés, cinemas, secondary schools, museums, and other cultural institutions could re-open again (with a maximum of 30 persons) after a lockdown of two months. The 1.5 meter rule was still in place during the period of the interviews, as were other preventive measures. The 1.5 meter rule applied to all youth, and they had to keep distance between each other as well. See Appendix 1 for all COVID-19 measures stated by the Dutch government during the period the interviews took place.

Due to the COVID-19 measures, most interviews were conducted through video calls or regular phone calls. Four interviews were conducted face-to-face because the problematic background of these youth warranted personal contact. The interviews were conducted by a team of 11 interviewers from the RIVM and the University of Amsterdam, because all interviews had to take place between a short time frame to ensure that the COVID-19 measures were the same for all participants. Interviewers used a semi-structured topic list with all relevant topics and were instructed on how to conduct the interview (Appendix 2). At the start of each interview, informed consent was asked from each participant. After obtaining permission, the interviews and informed consent were

recorded. The average duration of an interview was 43 minutes (range = 21-90 minutes). Two interviews were conducted in English, because these participants did not speak Dutch sufficiently. The rest of the interviews were conducted in Dutch. The interviews were transcribed verbatim.

Instruments

The semi-structured interview format consisted of three main interview topics: compliance with the 1.5 meter rule, perceived mental health issues and natural mentoring. In addition, the topic list included some demographic questions (age, gender, education, housing situation, and ethnicity) and the question whether the youth, or someone in their environment, is or were/was infected with COVID-19. See Appendix 2 for the complete topic list and Appendix 3 for the operationalization of the theory constructs.

COVID-19 Measure: 1.5 meter rule

Participants were asked what they thought about social distancing and how well they complied with it. Social distancing is one of the main COVID 19-measures, and in the Netherlands known as the '1.5 meter distance rule'. We explored to what degree they complied with this rule and what their reasons were to comply or not comply. Question examples are: "Why and when can you keep 1.5 meter distance and why and when are you unable to comply to 1.5 meter social distance?".

Perceived mental health issues

The participants were asked to what degree the COVID-19 pandemic and the COVID-19 measures influenced how they were feeling and what emotions they felt. If they were feeling negative emotions, they were asked how those emotions influenced complying with the social distancing measures. For instance, when they were feeling alone, they were asked if their loneliness influenced how well they complied with the social distancing measures. A question example is: "How does the COVID-19 pandemic and the COVID-19 measures influence how you are feeling?".

Natural mentoring

To get an idea whether natural mentorship influenced the compliance to the 1.5 meter measure, participants were asked whether they had a natural mentor (e.g., someone other than their parents that they could go to for advice and support), whether or not they had contact with a mentor during the COVID-19 pandemic, and whether or

not they discussed the COVID-19 measures with a mentor. A question example is: “How do the conversations you have with your natural mentor influence your compliance with the measures?”.

Coding and analysis

We used reflexive thematic analysis (TA) to code the data (Braun and Clarke 2006; Braun and Clarke 2020). Reflexive TA can be seen as an umbrella term for various approaches. This allowed us to create codes beforehand, based on theory, but also allowed for additional codes based on the data from the interviews themselves (inductive coding) (Boeije 2005; Braun and Clarke 2020). First, we used the theoretical frameworks from the ‘prevention behavior framework COVID-19’ that is used by the Behavioral Corona Unit of the National Institute for Public Health and the Environment (RIVM Behavioral Corona Unit & Scientific Advisory Board, 2020), which is based on the HBM and the theory of maintenance of behavior change, to create codes for compliance with the 1.5 meter rule (deductive coding). To add some nuance to those factors, subfactors were created during the coding (inductive coding). This resulted in 23 factors in total. All the factors and their operationalization for both compliance as well as non-compliance can be found in Appendix 4a. For example, the factor ‘cue to action’ has been operationalized in five subfactors, among others ‘knowing someone with COVID-19’, ‘a fine’, and ‘the government rules’, which specify the direction of the belief. During coding, a subfactor of the factor risk perception was added about trusting others (mostly family and friends) not to have the virus, which is slightly different than perceived susceptibility and perceived severity and therefore relevant to mention as a separate (sub)factor.

The topic about perceived mental health issues consisted of four broader codes about internalizing issues (e.g., anxiety), externalizing issues (e.g., anger), positive outcomes (e.g., more time for hobbies), and other negative outcomes (e.g., sleeping problems) and subcodes of the specific health issues (see Appendix 4b).

The topic about natural mentoring consisted of codes about who was the natural mentor (kin/non-kin and adult/non-adult), whether the interviewed youth spoke about COVID-19 and the measures with their natural mentor, to what degree this influenced their compliance to the preventive measures, and how the youth experienced support from (contact with) their natural mentor.

The transcripts were coded and analyzed using the software MAXQDA 2020 (VERBI software 2019). The first four authors started with coding the transcripts in two groups, which both consisted of two authors. The first group coded the compliance to the 1.5 meter rule and the factors mentioned by respondents for compliance, the other group

coded perceived mental health issues and natural mentoring. To increase trustworthiness and credibility, five transcripts were coded by all coders. These were discussed and compared. When sufficient inter-rater-reliability was achieved, the rest of the transcripts were coded. Coders remained in contact with each other to discuss difficult codes. Dividing the participants in the three groups was also done by all the coders in consultation.

After the transcripts were coded, the codes were analyzed and potential relations between topics were noted following the criteria of thematic analysis and using analytical tools such as a code matrix (Braun and Clarke 2006). Based on the analysis of the question to what extent respondents comply with the 1.5 meter rule, we distinguished three groups of participants: 1) participants that were almost always compliant with the 1.5 meter rule, 2) almost never compliant with the 1.5 meter rule, and 3) sometimes compliant and sometimes not compliant with the 1.5 meter rule. Depending on the compliance group, each participant was assigned factors for compliance and/or factors for non-compliance. The three compliance groups, including factors for each participant, were used for further analysis of mental health and natural mentorship. The results are presented for each compliance group separately.

Results

Twenty-one participants stated that they always complied with the 1.5 meter rule or at least most of the time (i.e., the mainly compliant group), 12 stated complying with the 1.5 meter rule sometimes (i.e., the sometimes compliant group), and two indicated that they did not comply with the 1.5 meter rule at all (i.e., the non-compliant group). The demographics of the participants (age and sex) appeared to have no relation to their compliance with the 1.5 meter rule, according to the code matrix. For each of the three groups of participants we have described what factors for compliance and non-compliance seem most important, what mental health issues are reported by the participants, and to what extent a natural mentor is involved with the participants. These participant groups are presented in Table 1.

Table 1

Demographics and the frequencies of the most mentioned codes per group.

	1) Mainly compliant group *(n = 21)*	**2) Sometimes compliant group *(n = 12)***	**3) Non-compliant group *(n = 2)***
Sex	Male (*n* = 11) Female (*n* = 10)	Male (*n* = 6) Female (*n* = 6)	Male (*n* = 1) Female (*n* = 1)
Mean age (*SD*)	19.71 (2.99)	19.58 (2.91)	18.50 (2.12)
Factors for (non)-compliance[a]	Main factors compliance: -motivation (*n* = 13) -physical environment (*n* = 6) -habit (*n* = 4)	Main factors compliance: -motivation (*n* = 10) -physical environment (*n* = 7) -risk perception (*n* = 4) Main factors non-compliance: -physical environment (*n* = 10) -risk perception (*n* = 7) -social barriers (*n* = 3) -social environment (*n* = 3)	Main factors non-compliance: -risk perception (*n* = 2) -response efficacy (*n* = 2)
Perceived mental health issues[b]	Internalizing issues (*n* = 16)	Internalizing issues (*n* = 9)	Internalizing issues (*n* = 1)
	Externalizing issues (*n* = 4)	Externalizing issues (*n* = 2)	Externalizing issues (*n* = 1)
	Other issues (*n* = 7)	Other issues (*n* = 4)	Other issues (*n* = 1)
	Positive outcomes (*n* = 10)	Positive outcomes (*n* = 5)	Positive outcomes (*n* = 1)
Natural mentoring	Natural mentor (*n* = 16) ▶ Spoke about COVID and measures (*n* = 14)	Natural mentor (*n* = 8) ▶ Spoke about COVID and measures (*n* = 7)	No natural mentor

Note. [a] most participants mentioned combinations of factors. [b] participants could experience multiple factors of mental health issues (e.g., internalizing and positive), examples are given in the text.

Group 1: Compliant most of the time

Seventeen of the 21 participants in the mainly compliant group stated that they complied with the 1.5 meter rule always or most of the time and specified why they follow this measure. The other four participants did not state any specific reason as of why they complied. This might be due to the fact that most interviews were conducted by phone, which might have hindered digging deeper. The most mentioned factor for complying with the 1.5 meter rule was *motivation*, more specifically feeling of solidarity with or feeling responsible for others, such as people with fragile health.

> *"I keep 1.5 meter distance, because I am aware of the fact that there is a greater chance of getting infected or infecting someone else with COVID-19 when you do not comply to this distance rule. As long as there is scientific evidence, you should follow it. And while the virus is still around, everyone should take their responsibility to avoid getting infected." -Male, 25 years old*

The second most mentioned reason was that they could follow the 1.5 meter rule because the *physical environment* facilitated keeping sufficient social distance from others. Regarding this, participants named supermarkets, shops, public spaces, and just being outside or on the street as examples of physical spaces where it is possible to keep a distance of 1.5 meter. The third most mentioned reason was that following the 1.5 meter rule has become a *habit*.

More than half of the participants mentioned at least two reasons for why they followed the 1.5 meter rule. Four different combinations of reasons for compliance were detected. First, compliance is fostered when youth are *motivated* to comply because they feel responsible for others and when the 1.5 meter rule has become a *habit*. Second, compliance is fostered when youth are *motivated* out of a feeling of responsibility for others and because the government says they have to comply or because of the risk of getting a fine in case of non-compliance (*cue to action*). Third, being *motivated* out of feeling responsible for others was often mentioned with a *physical environment* in which it is easy to keep 1.5 meter distance from others because there is sufficient space to do so. The fourth and final combination of reasons is being *motivated* out of a feeling of responsibility for others as well as considering the high risk of getting infected or infecting others with the Coronavirus (*risk perception*). This analysis suggests that being *motivated* to comply, and specifically feeling responsible for or solidarity with others, is particularly important for compliance with the 1.5 meter rule. Two participants mentioned *motivation* as their only reason for compliance, whereas the other participants stated another reason besides being *motivated*.

Regarding perceived mental health issues, most participants who stated that they always comply with the 1.5 meter rule experienced internalizing mental health issues. They mentioned anxiety, loss of motivation (e.g., for school) or loneliness. A few participants of this group mentioned externalizing mental health issues, such as anger. Some participants experienced other issues, like sleeping problems. Lastly, positive outcomes, such as having more time for sports or hobbies were also described by almost half of the participants. However, according to the code matrix, no explicit association between perceived mental health issues and following the 1.5 meter rule was found for the this group of youth who comply most of the time.

Regarding natural mentoring, most participants of the compliant group had a natural mentor to which most participants spoke about COVID-19 and the preventive measures. Additionally, half of the participants felt support from their natural mentor. Five participants had no natural mentor but mentioned that their parents or partner was their 'natural mentor'. Half of the participants who spoke with their mentor about COVID-19 and the measures also mentioned that they followed the 1.5 meter rule because they were feeling responsible/solidarity towards others.

> *"I have spoken with my mother's friend, who is like a second mother to me about the COVID-19 measures. Her father is 90 years old, and she has to be very cautious with who she is in contact with. She wants to reduce the infection risk as much as possible to avoid infecting her father. This raised awareness in me, to follow the 1.5 meter rule." -female, 19 years old*

Group 2: Sometimes compliant with the 1.5 meter rule

The most mentioned reason for compliance of the participants of this group was that they were *motivated* due to their solidarity with others. The second most stated reason was that they complied because the *physical environment* made it possible to keep 1.5 meter distance from others (e.g., outside on the street). The third and fourth most brought up reasons are: the risk of getting infected or infecting others is considered high (*risk perception*), believing other people might be infected with the virus/be contagious (*risk perception*). Eleven participants mentioned two or more reasons for their compliance. The combination that occurred the most was feeling solidarity with others (*motivation*) and the *physical environment* facilitating enough space to keep 1.5 meter distance. Another combination was the risk of getting infected or infecting others (*risk perception*) and the *physical environment* facilitating enough space to keep 1.5 meter distance.

The participants also articulated reasons as for why they do not always comply with the 1.5 meter rule. The most mentioned reason was that the *physical environment* does not

facilitate enough space to keep 1.5 meter distance (e.g. in the supermarket). The second most stated reason is that the participant trusts others to not have the virus (*risk perception*), and therefore they do not keep a distance of 1.5 meter. Other often mentioned reasons were: having close contact with others was considered more important than the risk of getting infected (*social barriers*) and keeping distance is not the norm of the social group (*social environment*). The situation in which participants say they do not comply with the 1.5 meter rule, was often with family and/or friends. Four participants mentioned only one reason for their non-compliance and the rest two or more reasons. The most occurring combinations were: the participant trusts the other person to not have the virus and the *physical environment* does not facilitate enough space to keep 1.5 distance, and the participant trusts the other to not have the virus (*risk perception*) and they feel having close contact with others is more important than the risk of getting infected with the virus (*social barriers*).

The analysis showed that trusting others to not have the virus (*risk perception*) seems to be an important reason for non-compliance (particularly in situations with family and/or friends) and that the *physical environment* and 'social barriers' also seem to play a role in non-compliance. The combination of *physical environment* and *risk perception* occurs for both compliance ('others may have the virus') and non-compliance ('trusting others to not have the virus'). Lastly, *physical environment* is also mentioned as a reason for both compliance and non-compliance.

> *"I can keep 1.5 meter distance at places like a tram stop, because I am waiting in one spot. But, when I have to board the tram or on the stairs at a train station I cannot keep 1.5 meter distance, because it is too busy and people are running to catch their train or tram" -female, 17 years old*

Regarding perceived mental health issues, most participants of this group experienced internalizing mental health issues, with more than half of them mentioning anxiety (n = 6). Some participants of this group experienced externalizing mental health issues (e.g., anger) and four participants mentioned other issues (e.g., boredom). Almost half of the participants of this group described they experienced positive outcomes as well, such as feeling happy. All six participants who mentioned anxiety (e.g., fear of getting infected with COVID-19) said they followed the 1.5 meter rule because they felt responsible for others.

> *"If I get infected it is my own fault, but I would hate it if I would infect my mother or father. So I am afraid to get infected, because I do not want to infect others." -male, 20 years old*

Regarding natural mentoring, most participants in this group had a natural mentor, of which almost all of them spoke about COVID-19 and the measures with their natural mentor. Some participants felt support from their natural mentor. Four participants did not have a natural mentor, but mentioned their parents or their partner. Four of the seven participants who spoke with their mentor about COVID-19 and the measures also mentioned they followed the 1.5 meter measure because they were feeling responsible/ solidarity for/with others.

Group 3: Non-compliant with the 1.5 meter rule

Two participants did not adhere to the 1.5 meter rule. When they were asked why they did not comply, they both said that they did not believe COVID-19 was real or posed a real threat.

> *"COVID-19 exists, but it is just like the flu. It has been blown up to exercise control over people. The 1.5 meter distance is everywhere, even in the law. This is just a plan to gain more control over people." - female, 17 years old*

Therefore, they did not perceive any threat (*risk perception*) and they also did not believe that the 1.5 meter rule would have any effect (*response efficacy*). One of them experienced mental health issues. No associations between perceived mental health issues and following the 1.5 meter rule were found. Both participants did not have a natural mentor.

Discussion

The purpose of this study was to examine which factors have played a role in how well youth in the Netherlands have complied with social distancing measures during the COVID-19 crisis. Our results show that most youth did comply with the 1.5 meter rule or at least tried to comply as much as they managed to. This is not in line with other studies, which have found that youth generally show less compliance than adults (Barari et al. 2020; Park et al. 2020). Additionally, Dutch media reported that youth did not comply well with the social distancing measures (e.g., Hart van Nederland 2020). Lastly, in Lisbon, non-complying youth were even considered as the main reason for the government to impose additional preventive measures (BNR Webredactie 2020). Besides this contract in results, it is noteworthy to point out that other preventive measures than social distancing might show different degrees of compliance (see Bacue Dion et al. 2021; Nivette et al. 2021; Zur Raffar et al. 2021). A limitation of these studies was that they asked youth whether they did or not comply; there was no specific category for 'sometimes compliant'. Our study

shows that this extra category of 'sometimes compliant' is a good addition, as compliance seems to be a construct of gradual differences instead of dichotomy. Compliance seems to depend on various factors. For the respondents in the sometimes compliant group, compliance with the 1.5 meter rule depends on their location (e.g., supermarket or work) or the people around them (e.g., friends or strangers). Compliance is therefore context-dependent, and this should also be taken into account in future research.

Why did most youth in our sample comply with the social distancing measures? Most of the youth stated that they complied because of their solidarity with others (factor motivation). This seems to be the most important reason for compliance with social distancing measures. This is in line with a study that found that almost half of an adult sample complied with social distancing measures because they felt solidarity with others or felt responsible for others (e.g., people with vulnerable health) (Liekefett and Becker 2021). A qualitative study found that protection of loved ones or social responsibility were commonly mentioned as reasons for compliance among adults (Wang et al. 2021). A study in Slovenia showed that youth and adults complied with COVID-19 preventive measures to protect vulnerable social groups (Mihelič et al. 2021). Given these findings about the importance of social solidarity, also identified by Misha and Rath (2020), in addition to social distancing measures governments should foster social solidarity by communicating about its importance. This promotion of solidarity happened in the Netherlands with messages such as "Alleen samen krijgen we Corona onder controle". This might enhance feelings of solidarity or a collective conscience, which in our study was an important reason for compliance. Lastly, it is notable, that even though youth have low perceived susceptibility (low health risk) in relation to COVID-19, they still show maintenance motives and perceived benefits (e.g., not infecting others) and comply with the social distancing measures.

Another frequently mentioned reason for both compliance and non-compliance with social distancing measures was whether the physical environment made it possible to keep a distance of 1.5 meter from other persons. The physical environment was therefore an important facilitator of compliance. Another important reason for youth to comply was the perceived risk of becoming infected or infecting others. Thus, if people perceive the risk of becoming infected or infecting others as high, this may enable compliance. This can be seen as a form of personal self-protection from the perceived threat of a virus (Brug et al. 2009; Liekefett and Becker 2021; Rubin et al. 2009). However, risk perception may also hinder compliance when the perceived risk of infection is low. This was the case when the participants in this study trusted others not to have the virus, which happened in particular in situations with family and/or friends.

This study found that youth frequently reported multiple reasons for their compliance (e.g., motivation and habit). This means that compliance to social distancing measures is a complex mechanism, which might depend on multiple factors. This is possible, since both the HBM and the theory of maintenance of behavior change distinguish factors that can exist alongside each other (Kwasnicka et al. 2016; Skinner et al. 2015).

The most frequently mentioned reasons for compliance, which were 'solidarity with others' and 'feeling responsible for others', stem from the 'maintenance motives' of the behavior change maintenance model (Kwasnicka et al. 2016). The definition of 'maintenance motives' is broad and therefore these specific reasons have not been widely researched in other health behavior studies (e.g., about dieting). Studies about dieting or quitting smoking tend to focus on satisfaction with behavior outcomes (e.g., I am motivated because I feel healthier and I am slim) (Kwasnicka et al. 2019). There is one study that showed similar reasons for vaccination willingness for travelling adults. Travelers felt that it was their and everyone's responsibility to get vaccinated before they travelled to protect others (Suess et al. 2022). Future research should investigate whether the specific reasons 'feeling solidarity with others' and 'feeling responsible for others' also exist in relation to other health behaviors, such as quitting smoking.

We also explored whether perceived mental health issues among youth influenced their compliance. We did not find explicit evidence for this relationship but did find that the youth who were experiencing anxiety issues also mentioned that they complied with the social distancing measures, because they felt solidarity with others or felt responsible for others. In other words, they might have been afraid of becoming infected with the Coronavirus because that would mean that they could also infect others with more vulnerable health. This would explain why they felt anxiety, which might have led to even greater compliance, due to their fear of infecting others. This is in line with the study by Harper et al. (2020) who found that anxiety about COVID-19 led to more compliance. However, in this study we did not specifically ask for anxiety of the Coronavirus, but anxiety issues as a whole. Future research should pay attention to these more specific anxieties.

It is notable, however, that a lot of youth in our sample were experiencing mental health issues. This is in line with numerous studies that show that youth experienced more mental health complaints during the COVID-19 pandemic, and specifically due to social distancing measures (Rauschenberg et al. 2021; Samji et al. 2022; Xie et al. 2020). However, we could not find a relationship between mental health issues and compliance in our study. The effect of mental health problems on compliance needs to be examined in future research, using bigger samples and, for instance, validated questionnaires to measure mental health.

More positively, youth did not only mention mental health complaints during the COVID-19 pandemic, but also stated various positive outcomes (e.g., more time for hobbies). This is in line with other studies that also found positive outcomes during the COVID-19 pandemic (e.g., increased creativity, increased social connectedness or support) (Dvorsky et al. 2020; Gijzen et al. 2020; Mercier et al. 2021; Penner et al. 2021; Suhail et al. 2021; Tull et al. 2020). In the current study we did not find a relationship between compliance and positive outcomes. If positive outcomes can, for instance, increase mental health, that could subsequently increase compliance. Further research to examine these links between positive outcomes, mental health and compliance is therefore worth doing.

Finally, and again more positively, this study did find that most of the interviewed youth seemed to have a natural mentor, and some of the participants also mentioned that their mentor supported them during the COVID-19 pandemic, and that they could talk with their mentor about the COVID-19 measures. These findings indicate that having a natural mentor helped with compliance to the social distancing measures, since the non-compliant group did not have natural mentors. This is supported by the theory behind natural mentoring, which assumes that a natural mentor can function as a role model or a person of guidance (Spencer et al. 2016). However, our study just offers an indication. Future research needs to examine the effect of a natural mentor on compliance using bigger samples (including both compliant and non-compliant youth).

Limitations and strengths

This study has several limitations. First, we used multiple interviewers, which might have influenced the quality and consistency of some interviews. This was necessary because the interviews had to be conducted in a limited timeframe. Second, the data we collected are based on the participants' own perception, which will have influenced the data. Because of social desirability, for example, the participants might have reported better compliance than how well they actually complied. For future research this can be averted by using unbiased forms of measuring compliance, such as camera images (see Hoeben et al. 2021). The final limitation of the study is that the relationships between mental health issues and compliance could not be explicitly examined, due to the insufficient information obtained from the questions asked.

However, this study also has notable strengths. The first is that it had a diverse and sufficiently large sample (Boddy 2016). We collected a sample which consisted of 35 youth with various backgrounds, housing situations, education levels, and ages ranging from 16 to 25. Another strength of the study is that it collected information in a short period

of time, which meant the same 'COVID-19 conditions' applied for each participant. This is a strength, certainly in a worldwide pandemic in which the situation and preventive measures changed all the time.

Implications and future research

A practical implication of the results of this study is that governments all over the world should address and/or keep addressing the motivations of youth to comply with social distancing measures. According to this study, they could address motivation as the willingness of youth to show solidarity with and responsibility for others. The government in the Netherlands already seeks to address motivation, as seen in the central slogan "Alleen samen krijgen we Corona onder controle" [Only together do we get COVID-19 under control], which also appears in government communication guidelines (Nationaal Kernteam Crisiscommunication (NKC) 2021). Governments should also praise youth for their compliance and emphasize that the COVID-19 pandemic could also have positive outcomes as well, such as more time for hobbies. Another important task for governments is to keep an eye on the mental health of youth and support youth in recognizing that there may also be positive outcomes (e.g., more time for hobbies). Lastly, we advise that youth are stimulated to have regular contact with their natural mentor and talk with them about the measures. Natural mentors, on the other hand, need to look after the youth and support them as much as they can, and governments can facilitate this by communicating how important these social support figures are.

Future research should investigate whether the specific reasons for compliance found in the current study (solidarity and responsibility) are also identified in other and larger samples, such as among adults, with other preventive measures than the social distancing measure and with other health behavior (e.g., quitting smoking). Future research could also pay attention to the youth compliance over time, since our study only measured compliance over a short period of time at a certain moment in the COVID-19 pandemic. It could be that during another period of this or a future pandemic, reasons for compliance might shift. Future research could also include less biased information about compliance, such as the use of video images referred to above (see Hoeben et al. 2021). The current study did include non-compliant youth, but this was a small sub-sample. Future research should examine non-compliant youth better with a larger sample, to understand their reasons for non-compliance.

Our current study could not investigate the effects of mental health on compliance specifically, so future research could focus on that relationship and might even use validated questionnaires to measure mental health problems. Our results showed

evidence of a possible relationship between anxiety and compliance. Additional research is needed to further examine this relationship, with also focusing on the kind of anxiety that is experienced (e.g., fear of getting infected with the Coronavirus). Lastly, future research should examine the relationship that was found in the current study between natural mentorship and compliance in a bigger sample.

Conclusion

This study offers insight as to why youth comply with social distancing measures in the Netherlands. Youth seemed to comply well with the social distancing measures, even though they have a low health risk, with the most important factor being 'motivation' (feeling solidarity with others and feeling responsible for others). Most youth mentioned multiple reasons for their compliance, which indicates that compliance is a complex mechanism. We suggest that the specific reasons for compliance found in our study are examined for other health behaviors as well (e.g., quitting smoking) Nevertheless, while youth seem to comply well, this does not mean they do not experience mental health issues, which may be related to COVID-19 pandemic, or the preventive measures that have an impact on social lives. We found that many youths experienced mental health issues, but also reported positive outcomes (e.g., more time for hobbies). Lastly, we found evidence that having a natural mentor could have a positive effect on compliance with the social distancing measures.

Appendices

Appendix 1

COVID-19 measures in the Netherlands during the period of the interviews (May 30th till June 10th)

Appendix 2

Topic list and instructions for interviewers.

Topic list interview

Introduction interview

Thank you for your participation on this interview. With this interview we would like to gather information about what you think about the preventive measures taken by the government to combat the COVID-19 pandemic, how these preventive measures influence your daily life, and how you handle these preventive measures. The information from this study will be used to improve the communication and policy from the government. Your participation is therefore valuable.

In this interview we will discuss the following topics[1]: the relaxation of the preventive measures, the 1.5 meter rule and avoiding crowds, your social life, how you are feeling, and the testing policy from the government. The interview will take approximately 45 to 60 minutes.

I would like to record this interview to make sure it can be transcribed, and all information can be used in the study. After the study the recording will be deleted. The transcript will be anonymous. Do you give permission to record the interview? Then I will start the recording and ask for your permission again, so that this is recorded as well.

-start recording-

Today is [date]. You are participant number [number]and you give your permission to record this interview, is that correct? [answer participant].

1. **Demographics**
    - Respondent number
    - Sex
    - Age
    - Where does the respondent live?
    - What country where you born?
    - What country where your parents born?
    - What is your housing situation? (e.g., with parents)
    - Do you follow education? If yes, what kind of education?
    - Do you have a job? If yes, what kind of job?

[1] This interview consisted of multiple topics. Only the topics used and discussed in this study are described.

2. Opening question

a. How are you doing under the current circumstances?
b. Did you get infected with COVID-19 yourself of do you know someone who got infected?
c. If yes, did you got ill from COVID-19 or did the person you know got very ill?

3. Compliance 1.5 meter rule

Introduction text: Besides the relaxations, there are still some preventive measures in place for everyone, such as the 1.5 meter rule.

a. How do you feel that you still have to keep 1.5 meter distance, despite the relaxations?
b. Is it clear for you in which situations you ought to keep 1.5 meters distance? If yes, In which situations is that the case? If not, why is this not clear?
c. There are youth who do not comply with the 1.5 meter rule. What is your opinion about that?
d. To what degree do you keep 1.5 meter distance to people who are not part of your household? When and where do you keep distance? When and where do you not keep distance?

[Information for interviewer: now is the time to ask why they do or do not comply with the 1.5 meter rule. Do this for both the situation where they do keep 1.5 meter distance and for the situation they do no keep 1.5 meter distance. Go in depth, since there are usually multiple reasons for compliance and non-compliance. See Table 1 for factors from the theory that can play a part in (non-)compliance.]

e. SITUATION 1: You say you can comply with the 1.5 meter rule in this place/ moment. Why do/can you comply with the 1.5 meter rule in this situation? Are there other reasons as for why you comply with the 1.5 meter rule?
f. SITUATION 2: You say you cannot comply with the 1.5 meter rule in this place/moment. Why do/can you not comply with the 1.5 meter rule in this situation? Are there other reasons as for why you can not comply with the 1.5 meter rule? [If necessary, ask for an additional situation]

[Information for interviewer: Ask questions about if it's about motivation, capacity, risk perception, or if is because of the physical/social environment]

4. Social contacts

a. What kind of impact does the 1.5 meter rule have on your social life? Think about friends, family, partner)
b. How do you keep in touch with people that are important to you?
    i. Which way or method do you use for contact? (face-to-face contact, video calling, WhatsApp etc.)

ii. Do you miss seeing people face-to-face? If yes, what do you miss the most? (skin contact, intimacy, someone who listens/offers support)

5. Social support

[Information for the interviewer: Social support specifically comprises natural mentoring in this interview. A natural mentor is an adult close to the youth, BESIDES their parents, who gives them advice, who supports them, who they confide in, and/or is someone they look up to. Ask about this person explicitly!]

a. Do you have an adult, other than a parent, in your environment who you can come to for counsel, advice and/or support? Such as an aunt, sports coach? Who is this person?
b. If yes, do you discuss the COVID-19 pandemic and the 1.5 meter rule with them?
    i. If yes, do these conversations with this person influence your compliance with the preventive measures? And, in what way?

6. Mental health

a. What impact does the COVID-19 pandemic and the 1.5 meter rule have on how you feel/your mental health [suggestions: mood, worrying, stress, loneliness, anxious, sleeping problems, decrease in concentration, more substance use etc.]
b. If you are feeling [answer participant], can you still comply to the preventive measures? Why or why not?
    i. At what moment is it the most difficult to comply with the preventive measures? Can you explain?

Thank the participant for their participation.

Appendix 3

Description of constructs from the HBM (Skinner et al., 2015) and themes from behavior change maintenance theories (Kwasnicka et al., 2016).

Construct	Description
HEALTH BELIEF MODEL	
Perceived threat	A combination of perceived susceptibility (a belief about the likelihood of getting a disease), and perceived severity (a belief about the seriousness of contracting an illness).
Perceived benefits (including outcome efficacy)	Beliefs about positive features or advantages of a recommended action to reduce threat of a disease. Outcome efficacy refers to beliefs about the extent to which a particular behavior leads to a certain outcome.
Perceived barriers	Beliefs about possible obstacles (such as inconvenience, costs, or fear) to take action, including negative consequences as a result from an action, which impede engagement in the health behavior.
Self-efficacy	The conviction that someone can successfully execute a behavior.
Cues to action	Internal or external cues that can trigger health behavior.
BEHAVIOR CHANGE MAINTENANCE THEORY	
Maintenance motives	Motives that enable regular gratification from enacting the new behavior, for example, by focusing on behavior enjoyment, satisfaction with behavioral outcomes, self-determination or if individuals experience congruence of the new behavior with their identify, beliefs and values.
Self-regulation	Any effort to actively control behavior by inhibiting dominant and automatic behavior, urges, emotions, or desires, and replacing those with goal-directed responses. This effort is influenced by the need for self-regulation, self-regulation skills, and coping with barriers.
Habits	Actions that have become automatically triggered by situational cues and are to be performed outside of conscious awareness. The development of habits follows a period of successfully self-regulation of a new behavior.
Resources	Physical and psychological assets that can be drawn on during the process of behavioral regulation. When resources are limited or depleted due to stress, or tiredness, an individual's self-regulatory capacity is limited.
Environment and social influences	Features of the social and environmental context of action which provide available options, set incentives and disincentives, opportunity costs and cues with contingency for behavioral responses.

Appendix 4a

Operationalization of factors from the theoretical framework for both compliance and non-compliance with the 1.5 meter rule

Code	Factors from theoretical model	Why comply	Why not comply
1a I	1a risk perception	The likelihood of becoming infected and/or infecting others with the virus is considered high.	The likelihood of becoming infected and/or infecting others with the virus is considered low.
1a II	1a risk perception	The respondent believes he can become seriously ill when being infected.	The respondent believes he can't become seriously ill when being infected.
1a III	1a risk perception	The respondent believes others may have the virus/be contagious.	The respondent trusts others to not have the virus/be contagious.
1b I	1b response efficacy (participative efficacy)	The respondent believes that keeping 1.5 meter distance from other people reduces the likelihood of being infected or infecting others.	The respondent does not believe that keeping 1.5 meter distance from other people reduces the likelihood of being infected or infecting others.
1b II	1b response efficacy (collective efficacy)	The respondent believes that if everyone keeps a distance of 1.5 meter from each other, this will reduce the risk of contamination.	The respondent does not believe that if we all keep a distance of 1.5 meter from each other, this will reduce the risk of contamination.
1c I	1c social barriers	The risk of being infected with the virus is considered more important than close/physical contact.	Close/physical contact is considered more important than the risk of being infected with the virus.
1c II	1c social barriers	Other people in the environment (family/friends) also comply with the rule and/or have a positive attitude towards the rule.	Other people in the environment (family/friends) do not comply with the rule and/or have a negative attitude towards the rule.
1c III	1c social barriers	-	Most people comply with the rule, so the respondent could be less strict, because one non-compliant person doesn't make a difference.
1c IV	1c self-efficacy	The respondent believes that he can implement the rule properly and consistently.	The respondent does not believe that he can implement the rule properly and consistently.
1d I	1d cue to action	The respondent knows someone who has suffered from corona (with serious consequences).	The respondent doesn't know anyone who has suffered from corona (with serious consequences).
1d II	1d cue to action	The respondent is convinced through a media message that it is the social norm to keep 1.5 meter distance.	The respondent sees through a media message that non-compliance with the 1.5 meter rule is the social norm.
1d III	1d cue to action	The respondent is aware through a media message of the consequences of not keeping 1.5 meter distance (e.g. many new infections)	-

Code	Factors from theoretical model	Why comply	Why not comply
1d IV	1d cue to action	The respondent wants to comply with the 1.5 meter rule, because the government says to do so and/or science provides evidence for this.	-
1d V	1d cue to action	The respondent complies with the rules, because of the risk of a fine.	-
2a I	2a motivation	The respondent experiences that keeping a distance of 1.5 meter from others helps to decrease spreading the virus.	The respondent does not experience that keeping a distance of 1.5 meter from others helps to decrease spreading the virus.
2a II	2a motivation	The respondent feels responsible for/ solidarity with others (e.g., elderly/ people with vulnerable health).	The respondent does not feel responsible for/solidarity with others (e.g., elderly/ people with vulnerable health).
2a III	2a motivation	The respondent does not want to get sick himself.	-
2b	2b self-regulation	The respondent aims to keep a distance of 1.5 meter/ plans beforehand how he can comply with this rule.	The respondent does not aim to keep a distance of 1.5 meter/does not plan beforehand how he can comply with this rule.
2c	2c habits	Keeping 1.5 meter distance from others has become a habit.	Keeping 1.5 meter distance from others has not (yet) become a habit.
2d	2d resources	The respondent has the physical or psychological capacity to comply with/maintain the rule.	The respondent does not have the physical or psychological capacity to comply with/maintain the rule, because of stress or tiredness.
2e I	2e physical environment	The physical environment (e.g. work environment, supermarket) makes it possible to keep 1.5 meter distance from others.	The physical environment (e.g. work environment, supermarket) makes it impossible to keep 1.5 meter distance from others.
2e II	2e social environment	Keeping a distance of 1.5 meter is the social norm in the respondent's social environment.	Keeping a distance of 1.5 meter is not the social norm in the respondent's social environment.
2e III	2e social environment	The respondent has someone close to him who supports/ reminds him that he should keep a distance of 1.5 meter.	The respondent does not have someone close to him who supports/reminds him that he should keep a distance of 1.5 meter.

Appendix 4b

Codes about mental health and natural mentoring

I1	Internalizing complaint 1 - Anxiety	The respondent experiences (feelings of) anxiety during the COVID-19 crisis (Y/N)
I2	Internalizing complaint 2 - Depression	The respondent experiences depressive feelings, feeling down and/or depressive mood during the COVID-19 crisis (Y/N)
I3	Internalizing complaint 3 - Loneliness	The respondent experiences loneliness or feels lonely during the COVID-19 crisis (Y/N)
I4	Internalizing complaint 4 - Stress	The respondent experiences (more) stress during the COVID-19 crisis (e.g., more stress at school) (Y/N)
I5	Internalizing complaint 5 - Sadness	The respondent experiences sadness during the COVID-19 crisis (Y/N)
I6	Internalizing complaint 6 – Feelings of being locked up	The respondent experiences feelings of being locked up/in during the COVID-19 crisis (e.g., the respondent feels locked inside their home) (Y/N)
I7	Internalizing compliant 7 – Loss of motivation	The respondent experiences loss of motivation due to the COVID-19 crisis (e.g., the respondent feels less motivation for school) (Y/N)
I8*	Internalizing complaint 8 - Moody	The respondent feels more moody/grumpy during the COVID-19 crisis (Y/N)
I9*	Internalizing complaint 9 – Irritable	The respondent feels more irritable and/or feels irritated faster during the COVID-19 crisis (Y/N)
I10*	Internalizing complaint 10 - Distrust	The respondent distrusts people/institutions or trusts nobody during the COVID-19 crisis (Y/N)
I11*	Internalizing complaint 11 - Worry	The respondent is worried during the COVID-19 crisis (e.g., the respondent worries about getting infected with COVID-19) (Y/N)
I12*	Internalizing complaint 12 – Emotional exhaustion	The respondent feels emotionally exhausted and/or emotionally drained during the COVID-19 crisis (Y/N)
E1	Externalizing complaint 1 - Anger	The respondent experiences feelings of anger during te COVID-19 crisis (Y/N)
E2	Externalizing complaint 2 – Oppositional behavior	The respondent describes oppositional behavior and/or rule-breaking behavior during the COVID-19 crisis (Y/N)
E3*	Externalizing complaint 3 – Frustration	The respondent experiences frustration during the COVID-19 crisis (Y/N)
O1	Other complaint 1 – Sleeping problems	The respondent experiences sleeping problems and/or less sleep during the COVID-19 crisis (Y/N)
O2	Other complaint 2 – Less energy/exhausted	The respondent feels less energetic, drained, and/or exhausted during the COVID-19 crisis (Y/N)
O3	Other complaint 3 - Boredom	The respondent feels bored during the COVID-19 crisis (Y/N)

O4	Other complaint 4 – Substance use/abuse	The respondent describes using substances such as alcohol or drugs during the COVID-19 crisis (Y/N)
O5	Other complaint 5 – Concentration problems	The respondent experienced concentration problems during the COVID-19 crisis (Y/N)
P1	Positive outcome 1 – Feeling more creative	The respondent experiences more creativity during the COVID-19 crisis (Y/N)
P2	Positive outcome 2 – Calmer mind	The respondent experiences a calmer mind and/or feels less flustered during the COVID-19 crisis (Y/N)
P3a	Positive outcome 3a – More time for hobbies	The respondent has more time for hobbies and/or practices hobbies more during the COVID-19 crisis (Y/N)
P3b	Positive outcome 3b - More time for sports	The respondent has more time for sports and/or practices sports more often during de COVID-19 crisis (Y/N)
P4*	Positive outcome 4 - Relief	The respondent experiences feelings of relief during the COVID-19 crisis (Y/N)
P5	Positive outcome 5 - Happiness	The respondent experiences feelings of happiness and/or feels more happy during the COVID-19 crisis (Y/N)
N1	Natural mentoring 1 – Kin/non-kin	The natural mentor of the respondent is a kin or not a kin (kin/non-kin)
N2	Natural mentoring 2 - Formality	The natural mentor of the respondent is a formal mentor (e.g., youth care worker) or an informal mentor (e.g., aunt) (formal/informal)
N3	Natural mentoring 3 - Adult	The natural mentor of the respondent is an adult and is older than 18 years old (Y/N)
N4	Natural mentoring 4 – Discuss COVID-19	The respondent and its natural mentor discussed the COVID-19 crisis and the preventive (social distancing) measures (Y/N)

Note. Codes marked with * were added during the coding of the transcripts (inductive coding).

Chapter 4

Has the COVID-19 Pandemic Affected the Mental Health of Late Adolescents and Young Adults? A Meta-analysis of the Evidence

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Abstract

The worst of the COVID-19 pandemic seems to be past us, but did the COVID-19 pandemic affect the mental health of late adolescents and young adults? The aim of this meta-analysis was to examine the effects of the first year of the COVID-19 pandemic on the mental health of late adolescents and young adults (16 – 30 years). We extracted 105 effect sizes from 22 studies. These were classified into 13 mental health domains and later merged into two overarching mental health domains, namely, internalizing and externalizing symptoms. The effect sizes ranged from d = -0.069 to d = 0.082, and were very small and non-significant. These results indicate that the COVID-19 pandemic did not have a significant effect on the mental health of late adolescents and young adults during the first year of the pandemic. Future research should focus on the possible long-term effects of the COVID-19 pandemic on mental health of late adolescents and young adults.

Keywords: COVID-19, Mental Health, Late Adolescents, Young Adults

Introduction

According to the WHO (World Health Organization), the COVID-19 pandemic had a severe impact on the mental health of people around the world (2022a), which is for instance evidenced by a substantial increase of 25% in the worldwide prevalence of anxiety and depression (WHO, 2022b). It is plausible to assume that the preventive measures that were put in place to reduce the spread of the COVID-19 virus, and in particular social distancing and quarantine measures, played a significant role in the deterioration of mental health of people. Indeed, the meta-analysis by Brooks et al. (2020) showed that the psychological impact of quarantine was substantial, wide ranging, and potentially long lasting. In addition, a systematic review by Pedrosa et al. (2020) provided evidence for the negative psychological impact of both the preventive measures and the COVID-19 pandemic itself. The current meta-analytic review focused on the mental health of particularly late adolescents and young adults, as they may have been affected most given their developmental stage.

Preventive measures such as quarantine, online education, and social distancing can be particularly challenging for young people, such as college students (Khan et al., 2022). Naturally, the COVID-19 pandemic came with multiple difficulties, such as high infection and death rates, and restrictive preventive measures. Although everyone faced these difficulties, late adolescents and young adults seem to have suffered the most. The infection rates were the lowest in young people, but multiple studies revealed that the increase in mental health problems were substantially higher in young people compared to adults (e.g., Courtney et al., 2020; Loades et al., 2020; Samji et al., 2021). In spring 2021, about 66% of young people in the age of 18 to 29 years were at risk for depression according to their self-reported score on the five item World Health Organization - Well-being Index (WHO-5) (Eurofound, 2021a). Given these alarming results, it is of particular interest to get a clear picture of the actual impact of the COVID-19 pandemic on young people.

Self Determination Theory (SDT; Ryan & Deci, 2000) offers an explanation as to why late adolescents and young adults were susceptible to the negative impact of the COVID-19 pandemic on their mental health. SDT is regarded as a broad theoretical framework that comprises six smaller sub-theories, of which one theory is the Basic Psychological Needs Model (BPNT, Deci & Ryan, 2017; Vansteenkiste et al., 2020). This model assumes that three basic psychological needs should be met in order to maintain personal psychological wellbeing and intrinsic motivation for healthy development (Baard et al., 2004; Luyckx et al., 2009; Ryan et al., 2008). These three needs concern competence, relatedness, and autonomy. The failure to meet these needs is as assumed to result in *need frustration*, which can lead to mental health problems or a decline in

wellbeing (Niemiec et al., 2006; Ryan et al., 2016; Vandenkerckhove et al., 2020; Vansteenkiste & Ryan, 2013). The fulfillment of all three needs was at risk during the COVID-19 pandemic.

The autonomy of young people was clearly at risk during the COVID-19 pandemic. Some preventive measures directly restricted the autonomy of people. Specifically, during the course of the COVID-19 pandemic many governments repeatedly reduced the freedom of citizens to go outside or to attend social gatherings by imposing social distancing measures. Many governmental measures like these were obligatory and led to a restriction of the opportunity for individual decision-making, such as not being able to go to work or engage in sports or social/group activities. This could lead to *autonomy need frustration* (see Vermote et al., 2021).

The COVID-19 pandemic and the preventive measures may have frustrated the need for relatedness as well. Because preventive measures greatly reduced the opportunity to socially connect with others (e.g., people were obliged to stay at home and to keep distance from others), it became difficult for young people to meet with friends and family, and to engage in physical contact. Although other means of social contact such as video calling were used more frequently to keep in touch with others, these technologically driven forms of communication are generally experienced to be less intense and fulfilling than face-to-face or physical contact (e.g., hugging) (Lee et al., 2011). Consequently, this may lead to *relatedness need frustration*, and result in solitude and feelings of loneliness (Vermote et al., 2021). Late adolescents and young adults are already at higher risk for loneliness because of developmental changes, so *relatedness need frustration* may further increase that risk (Laursen & Hartl, 2013).

Last, the need for competence was at risk during the COVID-19 pandemic. The closing of schools and other educational institutions hindered training in social, cognitive, and academic skills in the optimal context, hampering the acquisition of competencies and skills. Furthermore, some people might have doubted their capacity to balance their different roles (e.g., studying, working, and socializing both remotely and simultaneously), which could lead to feelings of ineffectiveness and less confidence (Spinelli et al., 2020). *Competence need frustration* can lead to feelings of inadequacy or failure (Bartholomew, Bosch et al., 2011; Bartholomew et al., 2011).

As soon as the COVID-19 pandemic was a fact, the impact of governmental measures and the pandemic itself on well-being and mental health gained attention among scholars all over the world. Consequently, an increasing number of primary studies examining the impact of the pandemic appeared, including studies focusing on the well-being and mental health of young adults and late adolescents in specific. These studies provide an inconclusive picture. Many studies found evidence for an increase in

mental health problems, such as depression symptoms, anxiety symptoms, and stress symptoms, but some studies found only small effects (Gopalan et al., 2022; Rimfeld et al., 2021), whereas others reported medium effects (Savage et al., 2022).

Some studies did not find an increase in mental health symptoms at all (Knowles et al., 2022) or even reported a decrease in these symptoms, albeit small in magnitude (Marmet et al., 2021). Furthermore, some studies showed an increase in one mental health symptom (e.g., depression), but a decrease in a different mental health symptom (e.g., anxiety) in the same sample (Hawes et al., 2021; Lee et al., 2020; McLafferty et al., 2021; Wieman et al., 2022). These results show that the primary evidence is inconclusive and that a clear understanding of how the pandemic has impacted the well-being, and mental health of young people could not be derived from the available primary research. Therefore, conducting a meta-analysis that summarizes all available empirical evidence is a valuable addition to the literature.

Current study

Until now, such a quantitative overview was not yet available. Therefore, this study aimed to provide such an overview by conducting a three-level meta-analysis that examined the impact of the COVID-19 pandemic on the well-being and mental health of late adolescents and young adults in the general population. In meeting this aim, mental health symptoms in the broadest possible sense were examined in a series of separate meta-analyses, as well as positive psychological attributes that define well-being (e.g., life satisfaction). As such, this meta-analytic review contributes to a further understanding of the short-term impact of the COVID-19 pandemic on the well-being and mental health of late adolescents and young adults in the general population.

Methods

Inclusion and Exclusion Criteria

Multiple criteria were formulated for the selection of primary studies.

Outcome

The aim was to shed light on how governmental measures taken during the COVID-19 pandemic affected the mental health of adolescents and young adults in the broadest possible sense. Therefore, studies examining any mental health problem or problem symptom(s) – either internalizing or externalizing – were included, such as studies examining substance abuse, depression symptoms, and/or anxiety symptoms.

Studies not specifically examining mental health problems, but other dimensions of mental health (e.g., life satisfaction or positive affect) were also included.

Study design

Studies had to examine the association between governmental measures that were taken during the COVID-19 pandemic (e.g., social distancing) and one or more aspects of mental health. This implied that the design of a primary study had to involve at least two measurement waves: One of the waves had to occur prior to the introduction of governmental measures so that it could serve as a baseline assessment, and at least one wave had to occur after these measures were introduced.

Study sample

This review focused on the mental health of late adolescents and young adults in the general population. Therefore, studies were included if the mean sample age was between 16 and 30 years. The standard deviation of this mean sample age was not restricted implying that adolescents younger than 16 and young adults older than 30 could have been sampled as well. Studies examining samples of late adolescents and young adults with a (pre-existing) mental health disorder or with a medical condition were not included.

Statistical information

Each study had to report at least one Cohen's *d* value, at least one effect size that could be transformed into Cohen's *d*, or sufficient statistical information to calculate at least one Cohen's *d* value. Examples of this information are means and standard deviations before and during/after governmental measures, proportions, and/or test statistic and *p* values.

Published and unpublished studies

To reduce the risk of publication bias, primary studies were eligible for inclusion when they were published either as a peer-reviewed journal article or as a (non-peer reviewed) research report that was digitally accessible to the authors of this review. Furthermore, (peer- or nonpeer-reviewed) pre-prints of scientific articles were eligible for inclusion. This latter criterion further reduced the risk for publication bias, but also assured that the most up-to-date primary study results could be part of the synthesis.

Language

Only English written studies of which the full text could be retrieved were included.

Exclusion

This review focused on the mental health of Western populations of adolescents and young adults, and primary studies conducted in non-Western countries were therefore excluded. Cross-sectional studies were excluded as well, because contrary to longitudinal studies, a cross-sectional design does not allow for drawing inferences on how governmental measures to reduce and avoid the spread of COVID-19 affected the mental health of late adolescents and young adults.

Search Strategy

In identifying relevant studies, we first searched the electronic databases MEDLINE, ERIC, and PsycINFO. The search string consisted of five components and was constructed with the help of an academic librarian with extensive knowledge about searching databases. The first component defined the COVID-19 measures and included permutations of keywords such as: “social distancing”, “lock down”, “isolation”, and “stay-at-home”. The second component defined mental health and comprised an extensive list of permutations of keywords such as: “depression”, “anxiety”, “mental health”, and “loneliness”. The third component consisted of permutations of keywords related to specifically the COVID-19 pandemic and not other pandemics and consisted of keywords such as “corona”, “COVID”, and “sarscov”. The fourth component defined the late adolescents and young adults with keywords such as: “youth”, “student”, and “adolescent”. The fifth and final component comprised keywords for reducing the number of hits by disregarding studies that are not eligible for inclusion. This last component consisted of an extensive list of permutations of keywords such as: “clinical”, “patient”, “elderly”, and “pregnant”. In the electronic search, we applied a filter so that only studies published between 2020 and 2022 were searched. Appendix A shows the full search string. We ended our search strategy in March 2022 after which we started coding the studies. The flowchart of the search procedure, the references of the included studies, and an overview of included studies and some of their characteristics can be found in Appendix B, Appendix C Appendix D, Appendix E, respectively.

Coding of Studies

A coding form was developed by the first and second author to code each of the included studies. This coding form was first tested and refined based on the first and second authors' independent codings of five studies that were randomly selected from all studies that were eligible for inclusion. These authors compared their codings, resolved any discrepancy through discussion, and adapted the coding form accordingly. After all authors agreed on the finalized coding form, the first author coded all retrieved primary studies including the five studies that were used for refining the coding form. In case the first author had doubts about any coding, the second author was consulted, after which a decision was made through discussion. Some variables were coded for descriptive purposes only. These variables were publication year, country in which a study was performed, percentage of Whites, and the number of days between the pre-COVID measure and each measure during the COVID pandemic a primary study reported on. Several other variables were coded as they may moderate the association between the enforcement of governmental COVID-19 measures and the mental health of adolescents and young adults (see below).

Type of mental health

As the number of mental health aspects examined in the primary studies was too large for performing an individual meta-analysis for each mental health aspect, we classified each examined mental health aspect into one of several more broadly defined "mental health domains". We defined a mental health domain as a broad category of mental health aspects or symptoms that are more or less similar in nature. These domains were created after all mental health aspects as examined in each of the included primary studies were coded. In total, 13 mental health domains were created, which are presented in Appendix F. A separate meta-analysis was performed for each of these domains. The 13 mental health domains were in itself also classified into two overarching domains: internalizing symptoms and externalizing symptoms. A separate meta-analysis was also performed for these two overarching domains of mental health.

Time passed since start COVID-19 pandemic

For each measurement wave within each study, the number of days between the start of the COVID-19 pandemic (March 11th, 2020, World Health Organization, 2020) and a particular wave was coded. This code provides information on the duration of a sample's exposure to governmental measures that were imposed to combat the pandemic. As an increase in this duration may increase levels of mental health problems, it was deemed relevant to code this variable.

Age, gender distribution, and drop-out in sampled participants

For each study, the mean age of the sample (in years), the percentage of males, and the percentage of drop-out were coded.

Status of publication

As we included both peer-reviewed published articles and article pre-prints, the publication status of each article was coded (published vs. pre-print).

The coding of all studies was performed in SPSS by the first author.

Calculating Effect Sizes

Cohen's *d* was used as common effect size measure to quantify the effect of the COVID-19 measures on the mental health of late adolescents and young adults. Most primary studies only reported means and standard deviations, so most *d* values were first calculated with an effect size calculator (Lipsey & Wilson, 2001). The formulas of Ferguson (1966), Rosenthal (1994), and Lipsey and Wilson (2000) were used to transform statistical information into Cohen's *d*.

In the primary studies that were eligible for inclusion, the same group of participants were assessed prior to governmental measures and during and/or after those measures. This type of design introduces dependency in data that should be taken into account when calculating effect sizes to obtain unbiased effects (Morris & DeShon, 2002). Therefore, the correlation between assessments (prior and during/after governmental measures) were taken into account in each effect size by transforming the calculated *d* values into new *d* values using formula 12 of Morris and DeShon (2002, pg.111). As primary studies seldomly report on the correlation between assessments, we estimated this correlation based on previous research (e.g., Lee, 2012; Lewinsohn et al., 2003; Ramo et al., 2020; Doran et al., 2022), which we estimated to be .40 for internalizing problems and .60 for externalizing problems. The latter correlation is estimated to be a bit higher than the former, because externalizing problems generally tend to require more effort to change than internalizing problems (Lee, 2012; Lewinsohn et al., 2003; Ramo et al., 2020; Doran et al., 2022).

As these correlation estimates represent best guesses but rather crude approximations of the data dependency in the primary studies examining internalizing and/or externalizing problems, we also calculated a set of Cohen's *d* values based on substantial higher correlations of .70 and .80 for internalizing and externalizing problems respectively, and a set of *d* values based on correlations of 0 for both internalizing and externalizing problems (assuming data independency). In this way, two sensitivity analyses

could be performed to determine how different estimates of data (in)dependency in the primary studies would affect the results. One of these analyses was conducted using the *d* values that were based on strong data dependency and the other was conducted using the *d* values that were based on data independency.

For each Cohen's *d* value, the formula of Morris and DeShon (2002) (fourth formula in Table 2, pg. 117) was used to calculate the standard error and variance. In these calculations of effect size accuracy, the dependency in data was taken into account using the same correlations as mentioned above.

Statistical Analysis

A main assumption in traditional meta-analysis is that effect sizes that are to be synthesized are independent (Lipsey & Wilson, 2000). However, the primary studies that were eligible for inclusion often reported on multiple relevant outcomes. If only one effect size had been extracted from each primary study, a lot of relevant information would be lost and statistical power in the analyses would decrease. Therefore, we applied a multilevel approach to meta-analysis in which the dependency in effect sizes is modeled so that all relevant effect sizes from each primary study could be extracted and synthesized (see, for instance, Assink & Wibbelink, 2016; Cheung, 2014; Van den Noortgate et al., 2013; Van den Noortgate, 2014). Specifically, we conducted three-level meta-analysis in which the effect size dependency is modeled by taking three sources of variance into account: sampling variance of the observed effect sizes (modeled at level 1), variance in effect sizes extracted from the same study (modeled at level 2 and also referred to as within-study variance), and variance in effect sizes extracted from different studies between studies (modeled at level 3 and also referred to as between-study variance). In short, two forms of dependency were taken into account in our analyses: dependency resulting from the association between baseline and follow-up assessments (see previous section on effect size calculation) and dependency resulting from extracting multiple relevant effect sizes from individual primary studies.

As we were interested in examining the effect of governmental measures on different mental health aspects, we conducted a separate three-level meta-analysis for each of the mental health domains that we created (described in the section on study coding). We were also interested in the effect of governmental measures on internalizing and externalizing problems in a broad sense, and we therefore also conducted a separate meta-analysis for internalizing and externalizing problems after we merged all internalizing and externalizing mental health domains respectively. All three-level meta-analyses were conducted following the steps of Assink and Wibbelink (2016).

To examine effect size heterogeneity and whether moderator analyses were warranted, two one-sided log-likelihood-ratio tests were conducted to test the significance of the within-study variance (at level 2 of the model) and the significance of the between-study variance (at level 3 of the model). A significant result of any of these tests indicates heterogeneity in effect sizes, implying that the overall mean effect size is not sufficiently representative of the true effect size, and that study, sample, and/or mental health characteristics may influence this effect. If heterogeneity in effect sizes would be detected, moderator analyses were performed in an attempt to explain this heterogeneity.

All meta-analytic models were built in the R environment (Version 4.2.1; R Core Team, 2022) by using the "rma.mv" function of the "metafor" package (Viechtbauer, 2010).

Assessment of Bias

Although we tried to be exhaustive in our search for relevant primary studies, we may have missed relevant studies because of limitations in our search strategy or because of different forms of bias, such as publication bias. To examine the extent to which our results were affected by (a form of) bias, two bias assessment analyses were conducted. First, we performed the funnel-plot-based trim and fill method (Duval & Tweedie, 2000a, 2000b) in each of the meta-analyses that were performed for each mental health domain. A funnel plot depicts effect sizes against a measure of precision (standard error in the current review). If the plot is asymmetrical because the distribution of effect sizes is asymmetric, the trim-and-fill method estimates effect sizes from 'missing studies' based on the observed effect sizes and adds these "missing" effect sizes to the plot to restore its symmetry. The imputed effect sizes can be higher or lower than the estimated mean effect and indicate whether meta-analytic results are underestimated or overestimated, respectively. In case of publication bias, low and/or insignificant effect sizes are missing implying that meta-analytic results overestimate true effects.

Second, we conducted an Egger's test in each of the meta-analyses to determine whether effect sizes are associated with their standard errors. A significant association indicates that meta-analytic results may have been affected by (a form of) bias. Here, we conducted an "adapted" Egger's test in which we tested the standard error as moderator of the overall effect size (see Sterne et al., 2000), by adding the standard error as a covariate to a three-level intercept-only model. A significant slope is an indication for publication bias.

Results

At the end of the search procedure, a total of k = 22 studies were included from which u =105 effect sizes were extracted. These studies were published between 2020 and 2022 (median publication year is 2021) and were conducted in Europe (k = 12) and North America (k = 10). Sample sizes ranged from 10 to 7686 (M = 740.82, SD = 1217.99). The mean sample age was on average 22.73 years (SD = 3.93), the mean percentage of males in the studied samples was 59.05 (SD = 34.52), and the mean percentage of Non-White participants in the samples was 35.78 (SD = 18.14), The number of extracted effect sizes ranged from 1 to 9, with a mean of 3.18 (SD = 2.07). The references of all included studies are presented in Appendix C, Appendix D presents an overview of included studies and some of their characteristics, and Appendix E provides information about the average effect size of the included studies.

Overall Mean Effects of the Mental Health Domains and Heterogeneity in Effect Sizes

The overall mean effects of the COVID-19 pandemic on each of the mental health domains can be found in Table 1. None of the conducted meta-analyses produced a significant overall effect. The non-significant mean effects ranged from d = -0.069 to d = 0.082 and can be regarded as extremely small according to Cohen's (1988) criteria for interpreting effect sizes. The two log-likelihood ratio tests that were performed in each meta-analysis to determine the significance of the variation in effect sizes did not reveal significant within-study variance nor between-study variance. This implied there was no significant heterogeneity in effect sizes. Therefore, no variables were tested as moderator. The mental health domain "anger" consisted of only two effect sizes (namely, d = .330, N = 378 and d = .242, N = 408) extracted from one study (Shanahan et al., 2022). Therefore, a meta-analysis was not conducted for this domain.

In calculating the effect sizes, we estimated the dependency between measures to be r = .40 for internalizing problems and r = .60 for externalizing problems. To examine whether the obtained mean effect sizes as presented in Table 1 were robust against different estimates of these correlations, two sensitivity analyses were conducted that comprised of reperforming the meta-analyses with Cohen's d values that were based on different correlations (r = .00 and r = .70 for internalizing problems, and r = .00 and r = .80 for externalizing problems). These analyses once again produced only non-significant mean effects that are all small or extremely small in magnitude according to Cohen's (1988) criteria. Also, no significant within- nor between-study variance was found in any of the sensitivity analyses implying the absence of effect size heterogeneity. These results

show that our initially obtained results seem robust against misspecifications of the correlations between assessments that were used in calculating the *d* values. Appendix G presents the results of these meta-analyses.

To increase statistical power, we also synthesized effect sizes in two additional meta-analyses. The first synthesized all effect sizes related to one of the internalizing mental health domains, whereas the second synthesized all effect sizes related to one of the externalizing mental health domains. We once again performed two sensitivity analyses for each of these meta-analyses. All results can be found in Table 2. In line with the results of the meta-analyses of each separate mental health domain, the table shows very small and non-significant mean effects of the COVID-19 pandemic on both internalizing and externalizing symptoms. The sensitivity analyses produced non-significant and very small effects for both internalizing and externalizing symptoms indicating that the results of the two meta-analyses seem robust against misspecifications of the estimated correlations between measures (i.e., $r = .40$ and $r = .60$ for internalizing symptoms and externalizing symptoms, respectively). In neither of the two meta-analyses significant within- and between-study variance was found, implying there is no heterogeneity in effect sizes. Heterogeneity was also not identified in the sensitivity analyses, as no significant within- nor between study variance was found. Therefore, no moderator analyses were conducted in the two meta-analyses on internalizing and externalizing problems in general.

Table 1

Mean Effect Sizes of the Mental Health Domains with Corresponding Level 2 and Level 3 Variance Estimates

Mental health domain	# Studies	# ES	Mean *d* (SE)	95% CI	Sig. Mean *d(p)*	% Var. at level 1	Level 2 variance	% Var. at level 2	Level 3 variance	% Var. at level 3
Anxiety symptoms (Int.)	9	13	0.008 (0.024)	[-0.043;0.060]	.727	100	0.000	0.00	0.000	0.00
Depression symptoms (Int.)	10	15	0.008 (0.026)	[-0.048;0.064]	.758	100	0.000	0.00	0.000	0.00
Stress symptoms (Int.)	8	14	0.050 (0.045)	[-0.047;0.146]	.289	82.79	0.000	0.00	0.004	17.21
Cannabis use (Ext.)	5	7	-0.055 (0.056)	[-0.192;0.082]	.362	100	0.000	0.00	0.000	0.00
Alcohol use (Ext.)	5	10	-0.015 (0.019)	[-0.059;0.029]	.465	100	0.000	0.00	0.000	0.00
Cigarette (nicotine) use (Ext.)	2	4	-0.040 (0.029)	[-0.134;0.054]	.268	100	0.000	0.00	0.000	0.00
Other substance use or addictive behavior (Ext.)	1	6	0.049 (0.033)	[-0.035;0.134]	.194	100	0.000	0.00	0.000	0.00
Sleeping problems (Int.)	3	8	-0.007 (0.030)	[-0.079;0.065]	.824	100	0.000	0.00	0.000	0.00
Loneliness (Int.)	2	3	0.082 (0.067)	[-0.206;0.371]	.344	100	0.000	0.00	0.000	0.00
General mental wellbeing (Int.)	2	3	-0.062 (0.184)	[-0.851;0.728]	.769	63.97	0.000	0.00	0.036	36.03
Other internalizing symptoms (Int.)	7	13	-0.069 (0.041)	[-0.158;0.019]	.112	100	0.000	0.00	0.000	0.00
Positive psychological attributes (Int.)	3	7	0.004 (0.033)	[-0.077;0.085]	.909	100	0.000	0.00	0.000	0.00

Note. #Studies = Number of studies; # ES = Number of effect sizes; Mean *d* = Mean Cohen's *d*; SE = Standard error; CI = Confidence interval; Var = Variance; Int. = Internalizing mental health domain; Ext. = Externalizing mental health domain.
For all internalizing mental health domains, a correlation of $r = .4$ was used in accounting for dependency in a pre- and during-COVID assessment. For all externalizing mental health domains, a correlation of $r = .6$ was used (see also the Methods section).
"Anger" is not presented as a mental health domain with an overall mean effect size, since effect sizes were extracted from only one study (see Results section for details).

Table 2

Mean Effect Sizes of the Overarching Mental Health Domains for the Initial and Sensitivity Analyses

Mental health domain	# Studies	# ES	Mean *d* (SE)	95% CI	Sig. Mean *d(p)*	% Var. at level 1	Level 2 variance	% Var. at level 2	Level 3 variance	% Var. at level 3
Initial analyses										
Internalizing symptoms (*r* =.4)	16	69	0.003 (0.013)	[-0.023;0.030]	.806	99.12	0.000	0.00	0.000	0.88
Externalizing symptoms (*r* = .6)	7	29	-0.010 (0.014)	[-0.039;0.019]	.486	100	0.000	0.00	0.000	0.00
Sensitivity analyses										
Internalizing symptoms (*r* = 0)	16	69	0.069 (0.039)	[-0.009;0.146]	.080	8.22	0.032	66.76	0.012	25.02
Internalizing symptoms (*r* = .7)	16	69	0.009 (0.015)	[-0.020;0.038]	.541	97.67	0.000	0.00	0.000	2.33
Externalizing symptoms (*r* = 0)	7	29	0.036 (0.033)	[-0.032;0.104]	.289	8.64	0.026	91.36	0.000	0.00
Externalizing symptoms (*r* = .8)	7	29	-0.013 (0.014)	[-0.042;0.015]	.349	100	0.000	0.00	0.000	0.00

Note. #Studies = Number of studies; # ES = Number of effect sizes; Mean *d* = Mean Cohen's *d*; SE = Standard error; CI = Confidence interval; Var = Variance. The correlation (*r*) represents the value that was used in the effect size calculations and represents the strength of the association between a pre-COVID and during-COVID measure that was taken into account (see Methods section for details).
Effect sizes for "anger" are part of "externalizing symptoms".

Assessment of Bias

Bias was assessed using two methods: the funnel plot based trim-and-fill method and the Egger's test. Appendix H presents a funnel plot of each mental health domain for which a meta-analysis was performed. The results of the trim-and-fill analysis indicated there was no bias in eight mental health domains. However, the results revealed a potential underrepresentation of below average effect sizes in the domains depression, stress, other substance use and addiction, and sleeping problems. In each of these domains, the "missing" effect sizes were imputed to the dataset after which the overall effects of these four domains were calculated again. The "adjusted" mean Cohen's *d* values were $d = 0.002$ for depression, $d = 0.010$ for stress, $d = 0.001$ for other substance use and addiction, and $d = -0.014$ for sleeping problems. None of these adjusted mean effects were significant.

The adapted Egger's test indicated publication bias for only one mental health domain which was the stress domain ($\beta_1 = 1.139$, $p = .033$, 95%CI [0.109, 2.169]). The slope was positive indicating a positive association between standard error and effect size, which is in line with the funnel plot that revealed that below average effect sizes were potentially missing.

Discussion

During the COVID-19 pandemic, an increasing number of scholars directed their attention to the impact of the pandemic, as governments all over the world implemented stay-at-home and social distancing measures. Because of their developmental stage, particularly late adolescents and young adults were challenged and vulnerable to the negative consequences of these imposed measures, as they faced periods of remote learning, closed schools, limited social interaction with peers, and restricted mobility, which affected their lives in an unprecedented way. This review aimed to examine the impact of the COVID-19 pandemic on multiple aspects of the mental health of late adolescents and young adults in the general population by performing a series of meta-analyses of internalizing symptoms (e.g., anxiety, depression), externalizing symptoms (e.g., anger, substance use), and positive psychological attributes (life satisfaction, self-efficacy). The results of these meta-analyses consistently show that the COVID-19 pandemic did not have a significant effect on any of the outcomes that were examined in this review. This implies that in general, the COVID-19 pandemic did not affect the mental health of late adolescents and young adults in the general population in terms of the outcomes that were examined in this review. How can we understand these results, and to what extent can they be generalized to other populations than the general population (e.g., those receiving mental health care)?

First, this review specifically focused on late adolescents and young adults from the general population, who may be less vulnerable to negative environmental influences than youth with pre-existing mental health problems. Indeed, studies found that people with pre-existing mental health problems showed an increase in the levels of their problems due to the COVID-19 pandemic and its accompanying preventive measures (Carvalho et al., 2022; Chatterjee et al., 2020; Fisher et al., 2022). Therefore, the results of the present meta-analysis cannot be generalized to clinical populations of young people who already faced stressors and/or risk factors prior to the pandemic.

Second, this review focused on mental health symptoms in late adolescents and young adults between 16 and 30 years, as they were thought to be most at risk for mental health problems due to the COVID-19 restrictions (e.g., Eurofound, 2021a; Samji et al., 2021). Indeed, there is some empirical evidence showing that younger age (18 to 35 years old) was associated with a decrease in mental health during the COVID-19 pandemic (O'Connor et al., 2020; Pieh et al., 2020; Pieh et al., 2021). Moreover, it seems that children as well as early and middle adolescents experienced different challenges during the COVID-19 pandemic than late adolescents and (young) adults. Their schools and universities were closed, they were forced to switch to online education, they could not go out or have close contact with their friends due to social distancing measures, and they often experienced a lack of future perspective (OECD, 2021; Power et al., 2020). It is plausible that late adolescents and young adults did not experience the same difficulties as children and early adolescents, and therefore the results of the current meta-analysis should not be generalized to younger populations.

Third, generalizability of the results is restricted, because this review synthesized results from only Western countries. We decided not to include studies performed in non-Western countries, as the COVID-19 preventive measures and the way in which populations have the means to cope with the measures may not have been comparable to the situation in Western countries. Late adolescents and young adults from non-Western (low-income) countries may not have had similar opportunities to follow education at home. They may not have received education at all or may not have had access to (mental) health services, which could have resulted in a greater risk for (mental) health problems. In contrast, late adolescents and young adults in Western countries may have had more opportunities and resources (e.g., funds for laptops or access to (mental) health services) to cope with the restrictive COVID-19 measures. On top of that, they may have been more resilient because resiliency-enhancing conditions in the pre-COVID period were more present in Western than in non-Western countries.

Psychological resilience is a factor that plays a key role in mental health and wellbeing, and is best conceived of as the dynamic process of positive adaption during and

after stressful life circumstances (Kalisch et al., 2017). Positively adapting to stressful and extraordinary conditions, such as the COVID-19 pandemic, can be seen as the ability to support or retrieve psychological wellbeing (Demetriou, 2021). Being unable to positively adapt to the reduced opportunities for social contact that was a direct consequence of social distancing measures may increase the risk of mental health problems. On the other hand, the perception that social support is available is associated with less mental health problems (e.g., Cicchetti et al., 1993).

It has been theorized that psychological resilience is not only based on an individual's personality and skills to cope with stressful situations, but also on the quality of relations with significant others (Masten et al., 2021; Raghavan & Sandanapitcha, 2020). A natural mentor is an example of someone who provides social support, which can increase resilience (Masten & Garmezy, 1985) and may act as a buffer against developing mental health problems in stressful situations. A natural mentor is a non-parental adult who provides support, may teach skills and moral values, increases motivation, and fosters self-esteem (Southwick et al., 2010). Following from this, it may be that those who have insufficient resources are unable to successfully adapt to a stressful live event, and may start showing mental health problems. This may have been the case for people who already showed mental health illness prior to the pandemic (Masten et al., 2021). However, even those people showed resilience in the first period of the COVID-19 pandemic (Pinkman et al., 2020).

Fourth, the increase in mental health problems in late adolescents and young adults, as found in multiple studies (e.g., Khan et al., 2022), may not have been caused by the COVID-19 pandemic and/or the restrictive measures. In the years before the pandemic, mental health problems in late adolescents and young adults have been steadily increasing for quite some years (Ford et al., 2021; Plana-Ripoll et al., 2022). It is reasonable to assume that this increase did not stop during the pandemic, and it may just be a continuation of the ongoing trend (Rømer et al., 2023). A study by Ten Have et al. (2023) could already confirm this line of reasoning for the Netherlands, which showed that the increase in mental health disorders was not caused by the COVID-19 pandemic. Future research should investigate whether these results hold for other countries as well.

Finally, how one copes with the COVID-19 pandemic can also be a factor that influences the development of mental health problems. Positive or active coping strategies are negatively associated with perceived stress, depression, anxiety, and insomnia (Budimir et al., 2020). Another study found that the use of positive (active) coping strategies were associated with higher wellbeing (McFadden et al., 2021). Therefore, it could mean that if one uses adequate coping strategies during a pandemic, mental health problems will not start to develop or increase.

Strengths and Limitations

The main strength of this study is that, to our knowledge, it is the first meta-analytic review in which three-level meta-analyses were conducted to examine the impact of the COVID-19 pandemic on a broad spectrum of various mental health outcomes in late adolescents and young adults in the general population, accounting for differences within and between studies.

Additionally, a second strength of this study is the sensitivity with which the analyses were done. We accounted for the dependency in data (since it concerns pre-pandemic and during pandemic measures within the same sample) and checked whether this led to substantial differences. We also created two overarching categories, namely internalizing and externalizing symptoms, to check if this would lead to a different result. Therefore, we depleted every option to account for differences in data to our knowledge. All efforts were in line with the primary results, thus the results of this study seem robust and not influenced by the dependency in the data.

However, this study also has its limitations. The first limitation of this meta-analysis is that relevant studies eligible for inclusion may have been missed. We only included studies that were published between 2020 and 2022. An alternative inclusion strategy would have been to include studies up to 2023, but this could have polluted the search results (for instance with primary studies reporting findings that were obtained in the second year of the pandemic). To check for potential publication bias, we applied two different methods. These methods showed some indication of publication bias in four mental health domains representing an underrepresentation of below average effect sizes, but it did not seem to influence the results.

The second limitation is that some mental health domains consisted of a small number of effect sizes. For instance, both the mental health domain ‘loneliness’ and ‘general mental well-being’ only consisted of 3 effect sizes from 2 studies. In an attempt to meet this problem, we increased the statistical power in the analyses by aggregating individual mental health domains in two broader domains: one for internalizing mental health (sub-) domains and one for externalizing mental health (sub-) domains

The final limitation is that the current results only apply to the first year of the pandemic. This period was intense and comprised many uncertainties (e.g., limited knowledge about the virus, no vaccines). Because of this time restriction, the results cannot be generalized to any potential long-term effects of the COVID-19 pandemic on the mental health of late adolescents and young adults. It may be well possible that their mental health in the second year of the pandemic deteriorated. Resilience is a dynamic construct, which could imply that an adolescent is resilient in the first year of the pandemic, but less resilient in the second year due to a decreasing resilience capacity (Masten &

Motti-Stefanidi, 2020). An additional meta-analysis synthesizing longitudinal data about the second year of the pandemic should be conducted in due time to gain more insight into the long-term effects of the pandemic and the measures that were imposed.

Conclusion and implications

To our knowledge, this is the first meta-analysis examining the effects of the COVID-19 pandemic on the well-being and mental health of late adolescents and young adults during the first year of the pandemic. Although the results of this study do not indicate that the first year of the COVID-19 pandemic had any effect on the mental health of adolescents and young adults, long-term effects should not be ruled out. Notably, the current results only apply to the general population. Late adolescents and young adults at risk and/or those with pre-existing mental health disorders or problems who were affected by the COVID-19 pandemic should receive proper care and support. Governments should also pay attention to the strengths of late adolescents and young adults and enable them to be resilient. They could monitor the mental health of late adolescents and young adults better and stimulate the use of natural mentors for support to improve resilience and wellbeing (Koper et al., 2022). Since this might not be the final pandemic humans have to endure, governments should make a careful consideration of which preventive measures are essential, and which preventive measures should be used as limited and as short-term as possible. Regardless, this study shows that the well-being and mental health of late adolescents and young adults from the general population was not affected by the COVID-19 pandemic, and therefore the restrictive measures imposed by the governments can be considered again for a future pandemic to curb infections, albeit as sparingly and short-term as possible.

Appendices

Appendix A

Search string

1 ("social distanc*" or "physical distanc*" or "interpersonal distanc*" or quarantin* or isolation or confinement or lockdown or "stay* at home" or separation or seclusion or "non-pharmaceutical intervention").mp. [mp=ti, ab, ot, nm, hw, fx, kf, ox, px, rx, ui, an, sy, id, tc, tm, mf]

2 (affect* or anger or anx* or depress* or distress* or fear* or frustrat* or happiness or happy or hopefulness* or irritabl* or loneliness or lonely or "mental health" or resilien* or sad* or "social deprivation" or "social effect" or "social impact" or "social relation*" or stress* or unhappy or wellbeing or well-being or internalizing or internalising or externalising or externalizing or aggress*).mp. [mp=ti, ab, ot, nm, hw, fx, kf, ox, px, rx, ui, an, sy, id, tc, tm, mf]

3 (corona or covid* or ncov* or sars* or sarscov* or "severe acute respiratory syndrom*" or "sudden acute respiratory syndrom*").mp. [mp=ti, ab, ot, nm, hw, fx, kf, ox, px, rx, ui, an, sy, id, tc, tm, mf]

4 (child* or prepub* or puber* or pubescen* or teen* or young* or youth* or minor* or underag* or juvenile* or preadolesc* or adolesc* or student*).mp. [mp=ti, ab, ot, nm, hw, fx, kf, ox, px, rx, ui, an, sy, id, tc, tm, mf]

5 1 and 2 and 3 and 4

6 limit 5 to yr="2020 - 2022"

7 limit 6 to all journals [Limit not valid in Ovid MEDLINE(R),Ovid MEDLINE(R) Daily Update,Ovid MEDLINE(R) PubMed not MEDLINE,Ovid MEDLINE(R) In-Process,Ovid MEDLINE(R) Publisher,ERIC; records were retained]

8 qualitativ*.mp. [mp=ti, ab, ot, nm, hw, fx, kf, ox, px, rx, ui, an, sy, id, tc, tm, mf]

9 (clinic* or hospit* or patient* or client* or outpatient* or medical or diseas* or illness* or diag* or disorder*).mp. [mp=ti, ab, ot, nm, hw, fx, kf, ox, px, rx, ui, an, sy, id, tc, tm, mf]

10 "physical health".mp. [mp=ti, ab, ot, nm, hw, fx, kf, ox, px, rx, ui, an, sy, id, tc, tm, mf]

11 (toddler* or infant* or baby or "middle childhood" or "early childhood" or preschool*).mp. [mp=ti, ab, ot, nm, hw, fx, kf, ox, px, rx, ui, an, sy, id, tc, tm, mf]

12 elderly.mp. [mp=ti, ab, ot, nm, hw, fx, kf, ox, px, rx, ui, an, sy, id, tc, tm, mf]

13 (pregnan* and prenatal).mp. [mp=ti, ab, ot, nm, hw, fx, kf, ox, px, rx, ui, an, sy, id, tc, tm, mf]

14 (labor or labour).mp. [mp=ti, ab, ot, nm, hw, fx, kf, ox, px, rx, ui, an, sy, id, tc, tm, mf]

15 syndrom*.mp. [mp=ti, ab, ot, nm, hw, fx, kf, ox, px, rx, ui, an, sy, id, tc, tm, mf]

16 pregnan*.mp. [mp=ti, ab, ot, nm, hw, fx, kf, ox, px, rx, ui, an, sy, id, tc, tm, mf]

17 (mother* or maternal).mp. [mp=ti, ab, ot, nm, hw, fx, kf, ox, px, rx, ui, an, sy, id, tc, tm, mf]

18 parenting.mp. [mp=ti, ab, ot, nm, hw, fx, kf, ox, px, rx, ui, an, sy, id, tc, tm, mf]

19 7 not 8

20 19 not 9

21 20 not 10

22 21 not 11

23 22 not 12

24 23 not 13

25 24 not 14

26 25 not 15

27 26 not 16

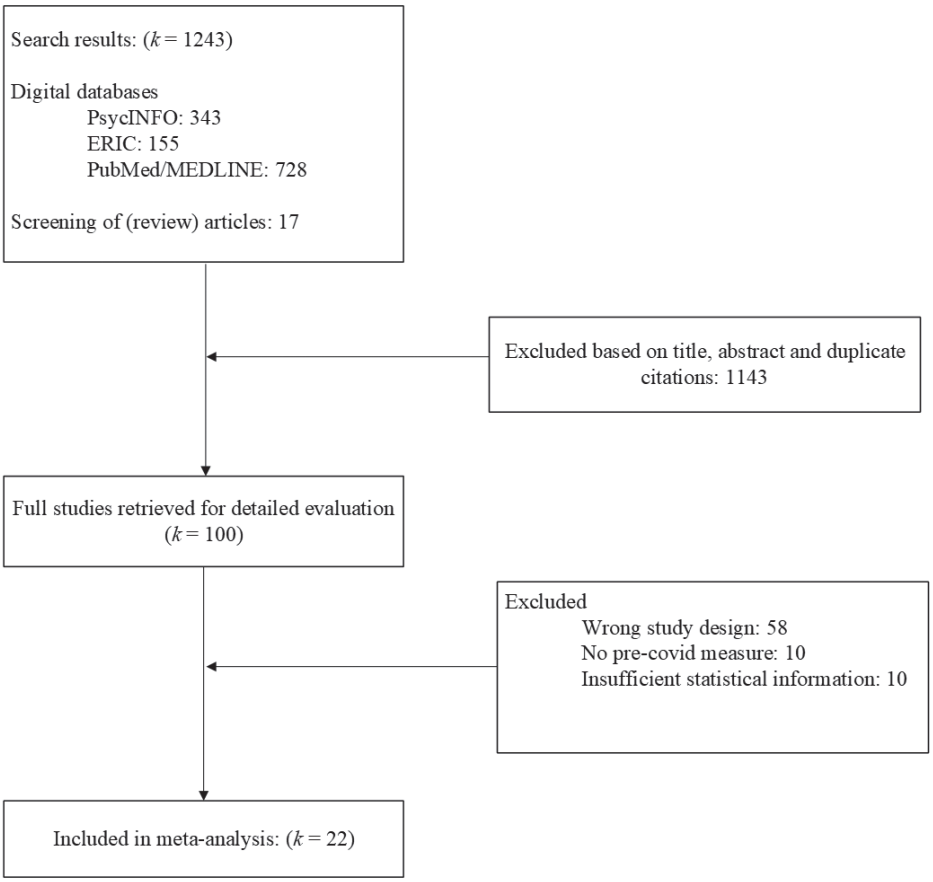
28 27 not 17

29 28 not 18

30 remove duplicates from 29

Appendix B

Flowchart of the study selection process



Appendix C

References of the included studies

Aresi, G., Sorgente, A., Cleveland, M. J., & Marta, E. (2022). Patterns of Alcohol Use Among Italian Young Adults Before and During a COVID-19 Lockdown: A Latent Class Analysis Study. *Journal of Prevention, 43*(2), 191-208. https://doi.org/10.1007/s10935-022-00675-2

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Gopalan, M., Linden-Carmichael, A., & Lanza, S. (2022). College students' sense of belonging and mental health amidst the COVID-19 pandemic. *Journal of Adolescent Health, 70*(2), 228-233. https://doi.org/10.1016/j.jadohealth.2021.10.010

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Krautter, K., Friese, M., Hart, A., & Reis, D. (2022). No party no joy?—Changes in university students' extraversion, neuroticism, and subjective well-being during two COVID-19 lockdowns. *Applied Psychology: Health and Well-Being, 14*(4), 1314-1332. https://doi.org/10.1111/aphw.12336

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Shanahan, L., Steinhoff, A., Bechtiger, L., Murray, A. L., Nivette, A., Hepp, U., Ribeaud, D., & Eisner, M. (2022). Emotional distress in young adults during the COVID-19 pandemic: evidence of risk and resilience from a longitudinal cohort study. *Psychological medicine, 52*(5), 824-833. https://doi.org/10.1017/S003329172000241X

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Wieman, S. T., Fields, J. S., Arditte Hall, K. A., MacDonald, H. Z., & Liverant, G. I. (2022). Effects of the COVID-19 pandemic on anhedonia, reward exposure and responsiveness, and sleep in college students. *Journal of American College Health, 2022*, 1-5. https://doi.org/10.1080/07448481.2022.2047705

Zimmermann, M., Bledsoe, C., & Papa, A. (2020). *The impact of the COVID-19 pandemic on college student mental health: A longitudinal examination of risk and protective factors.* PsyArXiv. https://doi.org/10.31234/osf.io/2y7hu

Appendix D

Characteristics of Included Studies

Reference	Year	Sample size	% Males	% Whites	Mean age of sample	Country[a]	# Extracted effect sizes	Mental health domain[b]
Aresi et al.	2022	7686	50.90	-	25.97	Italy	2	5
Baiano et al. (1)	2020	10	0	-	23.84	Italy	1	11
Baiano et al. (2)	2020	15	100		23.84	Italy	1	11
Bartel et al.	2020	70	34.30	-	22.03	Canada	2	4
Elmer et al. (1)	2020	212	64.00	-	19.82	Switzerland	4	1, 2, 3, 9
Elmer et al. (2)	2020	137	64.00	-	-	Switzerland	4	1, 2, 3, 9
Fruehwirth et al.	2021	439	28.00	60.10	18.90	USA	1	5
Gopalan et al.	2022	1004	38.20	62.80	19.34	USA	3	1, 2, 12
Graupensperger et al. (1)	2021	572	39.20	50.60	25.14	USA	3	4, 5
Graupensperger et al. (2)	2021	461	-	-	-	USA	1	5
Hawes et al. (1)	2022	451	34.60	82.90	17.49	USA	2	3
Hawes et al. (2)	2022	295	0	-	-	USA	2	1, 2
Hawes et al. (3)	2022	156	100	-	-	USA	2	1, 2
Knowles et al. (1)	2022	725	0	31.30	-	United Kingdom	3	1, 2, 11
Knowles et al. (2)	2022	349	100	31.30	-	United Kingdom	3	1, 2, 11
Krautter et al.	2022	162	21.40	-	21.90	Germany	3	11, 12
LaCaille et al.	2021	234	41.40	89.70	18.10	USA	2	3
Lee et al.	2020	564	39.30	54.50	25.10	USA	3	1, 2, 9
Marmet et al. (1)	2021	2035	100	-	29.10	Switzerland	9	2, 3, 4, 5, 6, 7, 8
Marmet et al.[c] (2)	2021	310	100	-	29.00	Switzerland	9	2, 3, 4, 5, 6, 7, 8

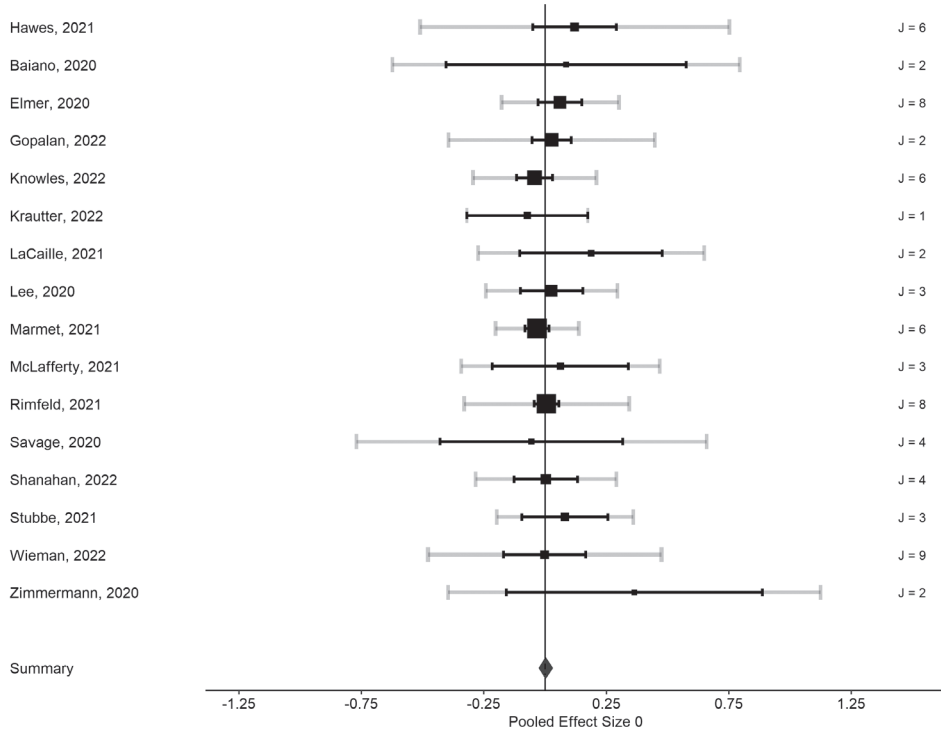
Reference	Year	Sample size	% Males	% Whites	Mean age of sample	Country[a]	# Extracted effect sizes	Mental health domain[b]
McLafferty et al.	2021	884	39.40	-	21.00	Ireland	3	1, 2, 11
Meine et al.[d]	2021	12 - 62	8.3 – 34.2	-	20.35 - 21.29	Germany	4	12
Rimfeld et al. (1)	2022	2691 - 2970	0	-	22.27	Multiple European countries	4	1, 2, 11
Rimfeld et al. (2)	2022	1538 - 1801	100	-	22.27	Multiple European countries	4	1, 2, 11
Savage et al. (1)	2020	154	0	77.40	20.00	United Kingdom	2	3, 10
Savage et al. (2)	2020	60	100	77.40	20.00	United Kingdom	2	3, 10
Shanahan et al. (1)	2022	378	0	-	22.00	Switzerland	3	3, 11, 13
Shanahan et al. (2)	2022	408	100	-	22.00	Switzerland	3	3, 11, 13
Skumlien et al. (1)	2021	170	45.80	-	22.51	Multiple European countries	3	4, 5, 6
Skumlien et al. (2)	2021	172	46.51	-	16.65	Multiple European countries	3	4, 5, 6
Stubbe et al.	2021	213	24.50	-	19.89	Netherlands	3	3, 8, 10
Wieman et al.	2022	87	12.60	74.70	-	USA	9	1, 2, 3, 8, 11
Zimmermann et al.	2020	205	23.80	83.90	18.40	USA	2	1, 2

Note. Year = publication year, % Males = percentage of males in a sample, % Whites = percentage of Whites/Caucasians in a sample, Continent = the continent the data collection took place, #Extracted effect sizes = the number of extracted effect sizes per study. [a] If study collected data from multiple countries, this was specified as multiple European/North-American countries. [b] Each number corresponds with a mental health domain. 1= Anxiety, 2 = Depression, 3 = Stress, 4 = Cannabis use, 5 = Alcohol use, 6= Cigarette use, 7 = Other substance use or addictive behavior, 8 = Sleeping problems, 9 = Loneliness, 10 = General mental wellbeing, 11 = Other internalizing symptoms, 12 = Positive psychological attributes, 13 = Anger. [c] Sexual minority sample. [d] study reports four different resilience trajectories. Dashes indicate that a statistic could not be retrieved from a study.

Appendix H

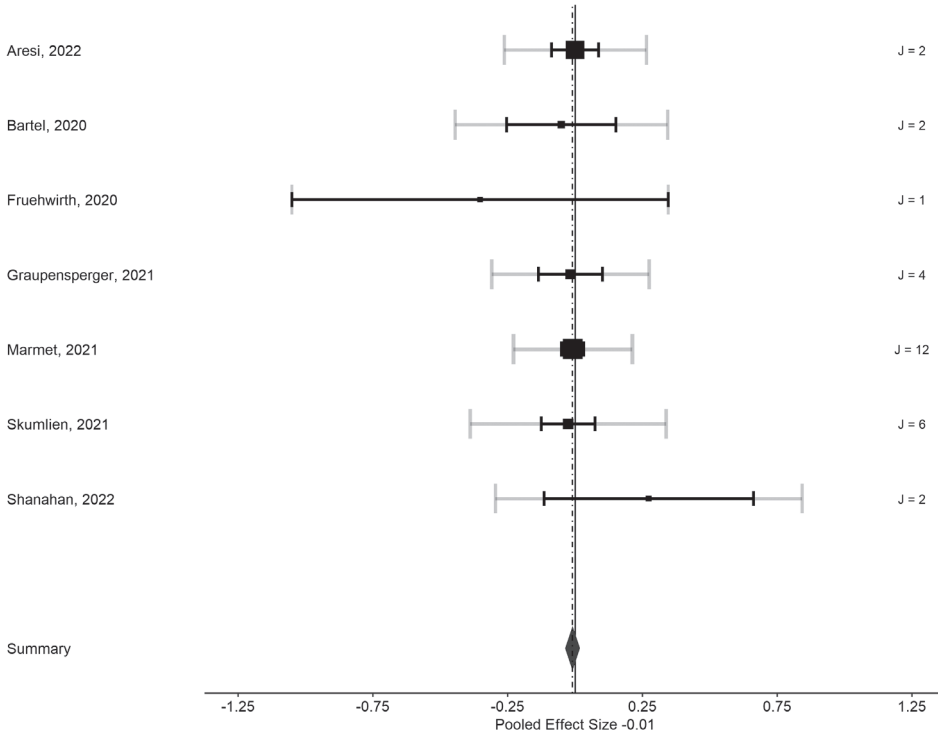
Forest plots

Figure 1. Forest plot internalizing symptoms



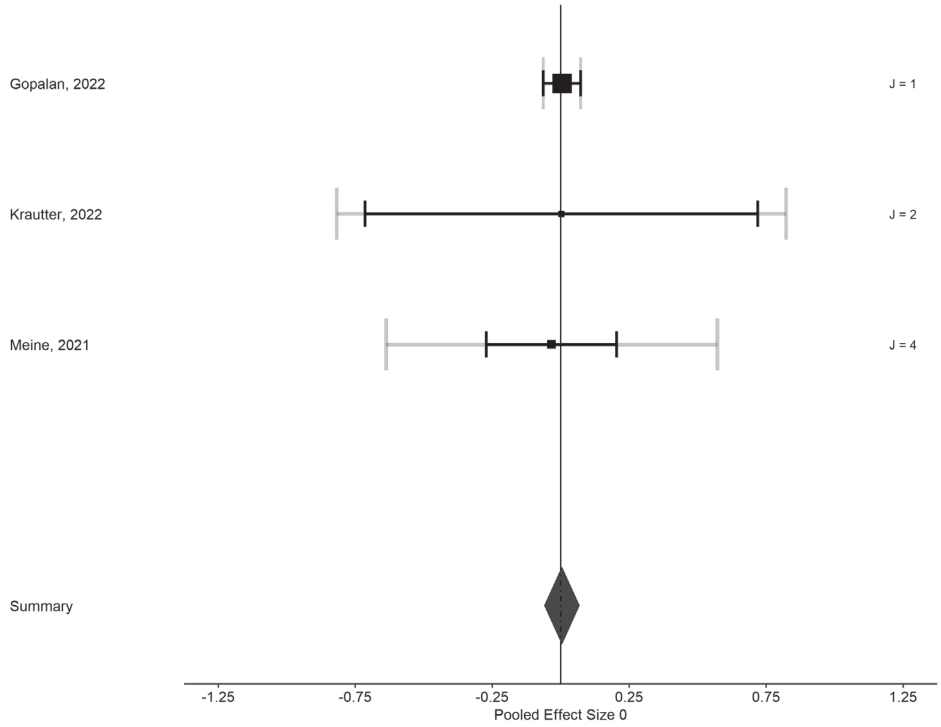
Note. A dot representing the meta-analytic study mean has been depicted in each line along with its 95% CI in bold black; the grey CI is based on the sampling variance of individual observed ES's of the study. The thickness of the grey confidence intervals is proportional to the number of effect sizes reported within studies.

Figure 2. Forest plot externalizing symptoms



Note. A dot representing the meta-analytic study mean has been depicted in each line along with its 95% CI in bold black; the grey CI is based on the sampling variance of individual observed ES's of the study. The thickness of the grey confidence intervals is proportional to the number of effect sizes reported within studies.

Figure 3. Forest plot positive psychological attributes



Note. A dot representing the meta-analytic study mean has been depicted in each line along with its 95% CI in bold black; the grey CI is based on the sampling variance of individual observed ES's of the study. The thickness of the grey confidence intervals is proportional to the number of effect sizes reported within studies.

Appendix F

List of Mental Health Domains

Mental health domain	Explanation
Anxiety	Anxiety symptoms as measured by per example the Generalized Anxiety Disorder -7 Assessment (GAD-7).
Depression	Depression symptoms as measured by per example the Short Mood and Feelings Questionnaire (SMFQ) or Patient Health Questionnaire (PHQ).
Stress	Stress symptoms as measured by per example the Perceived Stress Scale (PSS).
Cannabis use	Cannabis use measured as quantity (e.g., grams/joints per day/week).
Alcohol use	Alcohol use measured as quantity (e.g., glasses per day/week)
Cigarette (nicotine) use	Cigarette use measured as quantity (e.g., cigarettes per day/week)
Other substance use or addictive behavior	Residual category for other substance use (e.g., hard drugs) or other addictive behavior (e.g., pornography or social media)
Sleeping problems	Sleeping problems measured various ways such as quality of sleep or quantity of sleep.
Loneliness	Loneliness as measured by per example UCLA Loneliness Scale (University of California, Los Angeles).
General mental wellbeing	Residual category for general mental wellbeing, for instance measured by The Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS).
Other internalizing symptoms	Residual category for other internalizing mental health symptoms (e.g., anhedonia).
Positive psychological attributes	Category for all positive psychological attributes (e.g., self-efficacy or life satisfaction).
Anger[1]	Anger symptoms as measured by per example the PROMIS® Emotional Distress – Anger – Short Form.

Note. [1] = Anger was extracted from just one study, so no meta-analysis was done for this domain seperately. However, “anger” was included in the externalizing domain.

Appendix G

Sensitivity Analyses

Table G1

Mean Effect Sizes of the Mental Health Domains with Corresponding Level 2 and Level 3 Variance Estimates without accounting for dependency

Mental health domain	# Studies	# ES	Mean Cohen's *d* (SE)	95% CI	Sig. Mean *D (p)*	% Var. at level 1	Level 2 variance	% Var. at level 2	Level 3 variance	% Var. at level 3
Anxiety symptoms	9	13	-.008 (0.05)	[-0.117;0.101]	.878	12.43	0.026	87.57	0.000	0.000
Depression symptoms	10	15	.173 (0.083)	[-0.004;0.351]	.055	3.456	0.004	96.544	0.059	0.000
Stress symptoms	8	14	.163 (0.065)	[0.022;0.304]	.027*	6.460	0.007	93.540	0.023	0.000
Cannabis use	4	7	-.022 (0.083)	[-0.225;0.180]	.797	13.89	0.037	86.11	0.000	0.000
Alcohol use	5	10	-.029 (0.061)	[-0.166;0.108]	.641	2.375	0.029	97.625	0.000	0.000
Cigarette (nicotine) use	2	4	-.038 (0.027)	[-0.125;0.049]	.256	5.841	0.000	94.159	0.000	0.000
Other substance use or addictive behavior	1	6	.173 (0.055)	[0.031;0.314]	.026*	2.116	0.015	97.884	0.000	0.000
Sleeping problems	3	8	.147 (0.117)	[-0.129;0.423]	.249	12.096	0.000	87.904	0.034	0.000
Loneliness	2	3	.118 (0.047)	[-0.084;0.319]	.129	8.340	0.000	91.661	0.000	0.000
General mental wellbeing	2	3	-.117 (0.205)	[-1.000;0.767]	.627	17.212	0.000	82.788	0.072	0.000
Other internalizing symptoms	7	13	-.109 (0.073)	[-0.268;0.049]	.158	3.334	0.003	96.661	0.025	0.000
Positive psychological attributes	3	7	-.041 (0.135)	[-0.371;0.290]	.774	17.142	0.089	82.858	0.000	1.598

Note. Anger has not been included as a mental health domain, since the effect sizes were extracted from just one study. * $p < .05$

Table G2

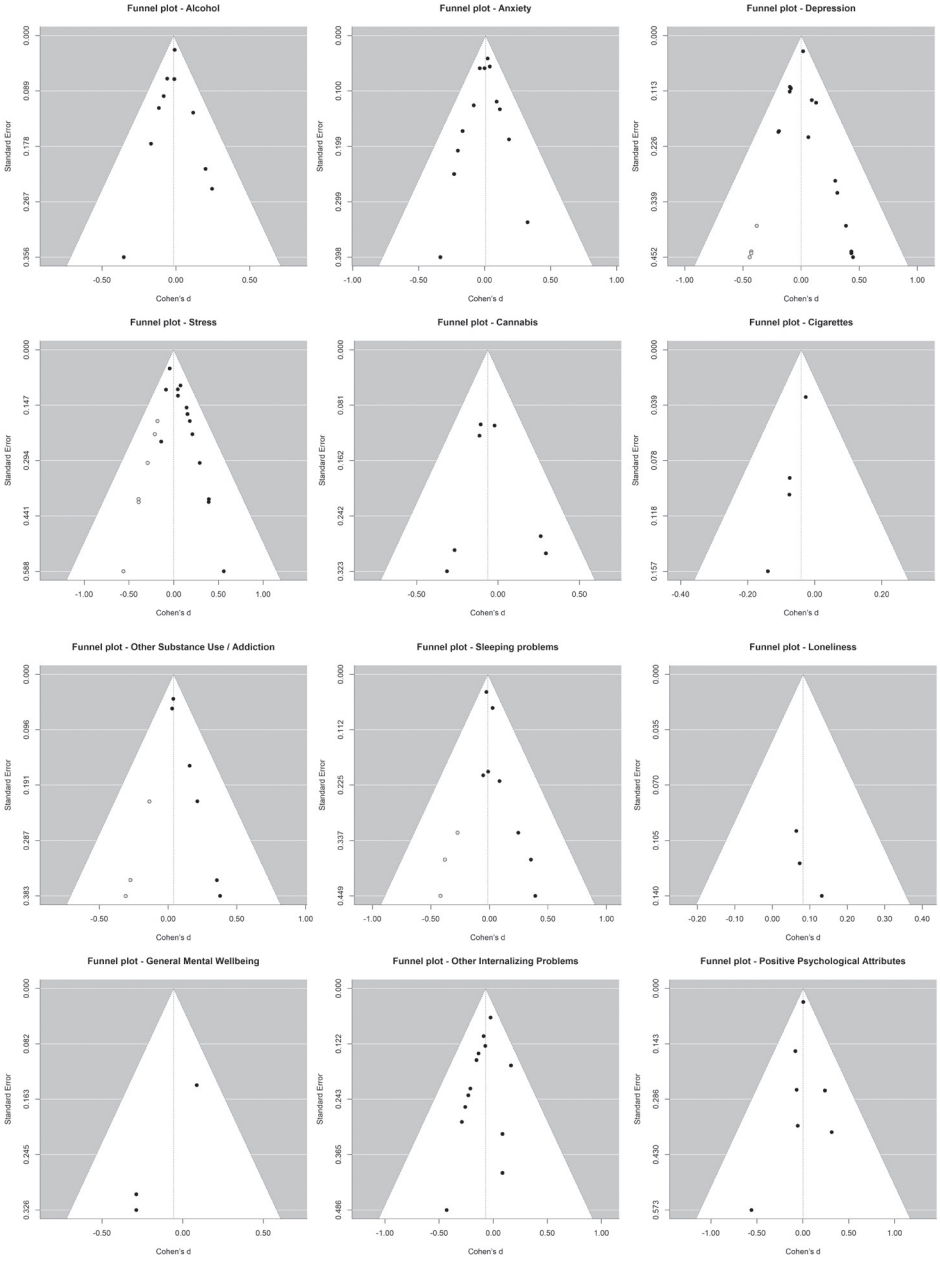
Mean Effect Sizes of the Mental Health Domains with Corresponding Level 2 and Level 3 Variance Estimates accounting for extreme high dependency

Mental health domain	# Studies	# ES	Mean Cohen's *d* (SE)	95% CI	Sig. Mean *D (p)*	% Var. at level 1	Level 2 variance	% Var. at level 2	Level 3 variance	% Var. at level 3
Anxiety symptoms	9	13	0.010 (0.023)	[-0.039,0.060]	.663	100	0.000	0.00	0.000	0.00
Depression symptoms	10	15	0.017 (0.027)	[-0.041;0.075]	.540	100	0.000	0.00	0.000	0.00
Stress symptoms	8	14	0.058 (0.052	[-0.054;0.170]	.286	80.57	0.000	0.00	0.006	19.43
Cannabis use	4	7	-0.065 (0.063)	[-0.219;0.089]	.342	100	0.000	0.00	0.000	0.00
Alcohol use	5	10	-0.016 (0.017)	[-0.055;0.022]	.362	100	0.000	0.00	0.000	0.00
Cigarette (nicotine) use	2	4	-0.056 (0.036)	[-0.170;0.058]	.214	100	0.000	0.00	0.000	0.00
Other substance use or addictive behavior	1	6	0.062 (0.038)	[-0.036;0.159]	.165	100	0.000	0.00	0.000	0.00
Sleeping problems	3	8	-0.005 (0.031)	[-0.080;0.069]	.871	100	0.000	0.00	0.000	0.00
Loneliness	2	3	0.110 (0.074)	[-0.208;0.427]	.276	100	0.000	0.00	0.000	0.00
General mental wellbeing	2	3	-0.079 (0.258)	[-1.188;1.030]	.788	54.79	0.000	0.00	0.086	45.21
Other internalizing symptoms	7	13	-0.070 (0.041)	[-0.160;0.021]	.118	100	0.000	0.00	0.000	0.00
Positive psychological attributes	3	7	0.004 (0.025)	[-0.057;0.064]	.886	100	0.000	0.00	0.000	0.00

Note. The correlations for the dependency are $r = .7$ for internalizing mental health domains and $r = .8$ for externalizing mental health domains. "Anger" has not been included as a mental health domain, since effect sizes were extracted from just one study.

Appendix H

Funnel plots



Chapter 5

Mental Health during the COVID-19 Pandemic: A One-Year Longitudinal Study in Late Adolescence and Early Adulthood

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Abstract

COVID-19 and the measures taken to contain the virus caused disruption in the lives of everyone, and particularly late adolescents and young adults may have been affected because of their developmental stage. In a sample of $N = 161$ late adolescents and young adults from the general population ($M_{age} = 21.17$, 87% female), this longitudinal study examined whether the COVID-19 duration affected mental health over the course of the first pandemic year, and whether the severity of the pandemic measures moderated this relation. When controlling for resilience and sex it was found that the duration of the pandemic was not associated with mental health, and that pandemic severity did not moderate this relation. It was also found that females reported more mental health problems and that greater resilience was associated with fewer mental health problems. Taking a mental health perspective on the impact of COVID-19 on the general population of young people, it is concluded that the various containment measures that were imposed during the first year of COVID-19 seem justified. However, it is discussed that the mental health of other (at-risk) groups may have been affected by the pandemic and the imposed measures.

Keywords: COVID-19 pandemic, Mental Health, Resilience, Late Adolescence, Early Adulthood

Introduction

When the World Health Organization (WHO) characterized the COVID-19 outbreak as a pandemic on March 11, 2020, and consequently urged governments worldwide to take measures to reduce the transmission of the virus, numerous researchers immediately expressed their worries about how measures such as quarantine and social distancing would negatively impact mental health. After all, the measures that were imposed – such as physical contact restrictions, various forms of lockdown, travel restrictions, curfews, and the requirement to wear masks – were drastic and considered to be highly intrusive for individuals (Khursid et al., 2020). Studies have suggested that disease mitigation measures to control a pandemic may increase stress levels, substance use, feelings of loneliness, and domestic abuse, but may also invoke other psychological problems, such as anxiety and depression (Clemens et al., 2020; Galea et al., 2020; Haider et al., 2020; Lewis, 2020). Although the mental health of the general population was at risk following the governmental measures that were imposed in the COVID-19 pandemic, late adolescents and young adults seemed particularly at risk for developing mental health problems (Imran et al., 2020; Liang et al., 2020). The present study aimed to examine whether the mental health of specifically late adolescents and young adults deteriorated during the first year of the COVID-19 pandemic.

During the COVID-19 pandemic, the measures that were taken to reduce the spread of COVID-19 varied over time, and ranged from relatively mild to highly intrusive measures, with far-reaching consequences for social interaction. For instance, quarantine implied that people had to socially isolate themselves whenever they experienced complaints or were diagnosed with COVID-19. Social distancing measures required that all people, even those without complaints, had to keep 1.5 meters distance from one another. During pandemic peaks even stricter measures were imposed, such as curfews and stay-at-home-obligations that stopped people, also those without complaints, from leaving their residences.

As the nature and intrusiveness of imposed measures varied during the pandemic depending on the spread of COVID-19, the mental health of adolescents and young adults may have varied as well, because their lives had been affected differently over the course of the pandemic. However, this has not been studied extensively. Many available studies focused on the first few weeks or month(s) of the pandemic in which relatively drastic and intrusive measures were imposed, such as lockdowns and curfews (Lee et al., 2020; Koning et al., 2022; Sønderskov et al., 2020; Wang et al., 2020a; Wang et al., 2020b). Moreover, these studies did not conduct substantial follow-up assessments when measures were mitigated or phased out. In addition, most studies were cross-sectional (i.e., Lee et al., 2020; Koning et al., 2022) rather than longitudinal. It is plausible to suggest that mental health problems may increase as the pandemic continues, because of the

accumulated exposure to stress induced by the containment measures and/or the spread of COVID-19 itself. Also, changes in the severity of imposed measures in terms of their intrusiveness may affect mental health, for instance because people may have felt less socially connected in periods in which relatively severe measures were imposed. As the current body of literature does not sufficiently address these issues, the present one-year longitudinal study evaluated changes in mental health during the first year of COVID-19 year. It was also examined whether the severity of imposed measures strengthened the association between the duration of the pandemic and mental health.

Most available (longitudinal) studies on the effects of the COVID-19 pandemic measures studied mental health in adults from the general population (e.g., Kämpfen et al., 2020; Marroquín et al., 2020; Zhao et al., 2020). However, several review studies suggested that younger age could be a risk factor for developing mental health problems during the COVID-19 pandemic (Loades et al., 2020; Meherali et al., 2021; Samji et al., 2022). Also, there is some empirical evidence showing that female adolescents experienced more mental health problems during the COVID-19 pandemic than male adolescents (Magson et al., 2021). It can therefore be assumed that late adolescents and young adults – and particularly young women – may have been more at risk for developing mental health problems during the COVID-19 pandemic than adults. Therefore, this study specifically focused on the mental health of late adolescents and young adults, and considered sex as a potential confounder.

The increased risk for developing mental health problems faced by late adolescents and young adults during the COVID-19 pandemic can be explained by their developmental stage, since engagement in social interaction is pivotal to their identity development. Erikson (1968) stated that one must master or resolve eight subsequent “stages of crisis” as part of the identity development, including developing a sense of identity and intimacy. The fifth stage of “Identity versus Role confusion” and the sixth stage of “Intimacy versus Isolation” take place during adolescence and young adulthood (Branje & Koper, 2018), and are both mastered and/or resolved through contact with others. During adolescence, the relationships between adolescents and their family members change as they shift towards spending more time with their peers (Kerpelman & Pittman, 2018; Magson et al., 2021). Not being able to successfully master or resolve a developmental stage can hinder identity development and poses a risk for mental health problems (e.g., anxiety, depression, loneliness) (Branje et al., 2018; Crocetti et al., 2009; Harter et al., 1996; Sandhu et al., 2012).

Social distancing measures that were imposed during the COVID-19 pandemic severely restricted opportunities for social interaction (e.g., attending social events) and intimacy (e.g., experiencing physical touch), and may have hindered identity development

of late adolescents and young adults. Although the population in general had to deal with these measures, it can be reasoned that late adolescents and young adults were at higher risk for developing mental health problems during the COVID-19 pandemic than adults, as social interaction is crucial for their development.

Particularly those who lived on their own, or those who just left their parental home, may have been negatively affected in their social interaction by measures such as lockdown or curfews. Social interactions were even more limited for single households, because stay-at-home measures and the requirement to practice social distancing with anyone outside a household were somewhat less drastic for multiple-person households. Adolescents and young adults in single households may thus have experienced even more mental health problems (Elmer et al., 2020), and therefore this study considered the living situation as a potential confounder as well.

Besides that social interaction is crucial for identity development (Branje et al., 2018; Crocetti et al., 2009; Harter et al., 1996; Sandhu et al., 2012), late adolescents and young adults greatly benefit from social interaction in the form of social support that they may receive from others. There is ample evidence that supportive relationships with others buffer against the development of mental health problems in general (Harandi et al., 2017; Vandervoort, 1999) and in late adolescents and young adults in particular (Klineberg et al., 2006). Adolescents and young adults may engage in supportive relationships with peers from which they benefit (e.g., Droogenbroeck et al., 2018; Klineberg et al., 2006; Roos & Cohen, 1987; Szkody et al., 2021), but also with adults, which is thought to have a similar buffering effect against mental health problems (Bal et al., 2003; Brady et al., 2017; Rothon et al., 2012). Particularly adults in the direct social environment of young people can fulfill a supporting role as so-called informal mentors (Van Dam et al., 2018). An informal or natural mentor is an adult in the direct social environment of an adolescent other than a parent, who helps, supports, and offers guidance to the adolescent. There is empirical evidence showing that supportive relationships with mentors, both formal and informal, are associated with greater resilience and fewer mental health problems in young people (Koper et al., 2022; Van Dam et al., 2018). In terms of identity development and supportive relationships it is thus crucial that young people engage in social interaction. When social interaction and the opportunity to benefit from supportive relationships is impeded, as was the case during COVID-19, the risk for mental health problems may increase in particularly adolescents and young adults.

Last, another factor which could have a buffering effect on developing mental health problems is resilience (Demetriou, 2021). Resilience can be described as the dynamic process of positive adaption during and after stressful life circumstances, such as the COVID-19 pandemic (Kalisch et al., 2017). Resilience has been widely research and

higher resilience levels are associated with fewer mental health problems (Gheshlagh et al., 2017; Hu et al., 2015; Ungar & Theron, 2020). Therefore, the current study also examined resilience and the availability of a natural mentor as potential confounders.

The Current Study

This one-year longitudinal study aimed to examine whether the COVID-19 pandemic duration was associated with mental health problems of late adolescents and young adults over the course of the first year of the pandemic. A second aim was to examine whether the severity of the pandemic measures moderated this relation. To address these aims, late adolescents and young adults were sampled from the general population in the Netherlands and were asked to participate in ten assessments between April 2020 and April 2021. Partly informed by empirical evidence, this study considered certain demographics (sex, age, education level, and living situation), the availability of a natural mentor, and resilience, as potential confounders in the analyses.

Methods

Participants

A total of 263 Dutch-speaking participants enrolled in the first wave of this study. Due to the longitudinal nature of this study, only those who completed at least two survey waves were included in the analyses. The final sample consisted of 161 participants (M_{age} = 21.17, SD_{age} = 2.38, range = 16 – 24 years, 87% female). Based on the guidelines of the Central Bureau of Statistics (CBS, 2024) of the Netherlands for classifying educational levels into categories, most participants followed or finished a high level of education (*n* = 128; 79.5%), some followed or finished a middle level of education (*n* = 31; 19.3%), and a few followed or finished a low level of education (*n* = 2; 1.2%). Dutch guidelines for education were used in favor of international guidelines, because the Dutch education levels are difficult to translate to international guidelines. Of all 161 participants, *n* = 37 (23.0%) lived in a single household on their own, and nearly all participants had a natural mentor (*n* = 152; 94.4 %).

Procedure

The current study was approved by the ethics committee of the Faculty of Social and Behavioral Sciences of the University of Amsterdam (2020-CDE-12058). Participants were recruited online through social media channels such as Facebook, a one-time national radio recruitment, and the website of the University of Amsterdam. The participants filled

out the survey online, because of the lockdown and social distancing measures following the COVID-19 pandemic. Participation in the study was voluntarily, and no reward was given for participation. The questionnaire was designed and shared through Qualtrics. The first questionnaire was available on April 1st 2020 and remained open for 14 days, which was during the first lockdown in the Netherlands. The subsequent measurement waves were instigated by a change in nature of the imposed (preventive) measures, meaning that measures were sometimes more severe and at other times less severe depending on the spread of COVID-19. Participants could complete each wave within 7 days after a survey wave was initiated, which occurred more often in the first several months of the COVID-19 pandemic and less often in the following months of the first year of the pandemic. The final measurement wave, one year after the start of the COVID-19 pandemic, became available on March 31st, 2021, and remained open for 14 days. For all specific dates and the corresponding risk levels during each time period as stated by the Dutch government, see Appendix 1.

Instruments

The respondents were asked about their mental health problems and their degree of resilience, by means of standardized and validated questionnaires (T1-T10). In addition, questions were asked about demographics (sex, age, education level, and living situation; T1), and availability of a natural mentor (T1 and T10). The questionnaire was in Dutch and comprised Dutch translations of standardized questionnaires. Pandemic severity was operationalized using the risk levels as stated by the Dutch government, where a high risk level corresponded with greater pandemic severity (see Appendix 1).

Symptom Checklist-27 (SCL-27)

Mental health problems were assessed with the Dutch translation of the Symptom Checklist-27 (SCL-27), which is an abbreviated version of the Dutch SCL-90-R (Arrindell & Ettema, 2003) and a multidimensional screening questionnaire for mental health symptoms. The SCL-27 contains 27 items, divided over six scales that assess depressive symptoms, dysthymic symptoms, physical symptoms, symptoms of agoraphobia, symptoms of social phobia, and symptoms of distrust. For the current study, only the total scale was used as we were interested in mental health in general rather than specific mental health symptoms. Items were responded to on a 5-point Likert scale ranging from (1) ‘not at all’ to (5) ‘a lot’. A mean item score was calculated for each participant. The SCL-27 has been validated in the Dutch population (Koning et al., 2025), and showed excellent reliability in the current study (range α = .92 - .96).

Child and Youth Resilience Measure-12 (CYRM-12)

Resilience was assessed using the Child and Youth Resilience Measure-12 (CYRM-12), an abbreviated version of the CYRM-28 (Liebenberg et al., 2013). The CYRM-12 contains 12 items across three scales that measure individual capabilities/ resources, relationships with primary care givers, and contextual factors that facilitate a sense of belonging. Respondents replied to items on a 5-point Likert scale ranging from (1) 'not at all' to (5) 'a lot'. A mean score was calculated for each participant. The validity and reliability of the Dutch translation of the CYRM-12 has shown to be moderate and improved by removing two items that showed insufficient fit (Koning et al., 2025). Therefore, the current study used the Dutch 10-item CYRM, excluding items 1 and 2, which showed good reliability in the current sample (range α = .78 - .87).

Natural Mentor Questions

Participants were asked whether or not they had a supportive relationship with a natural mentor. This question was asked in the first (T1) and last (T10) survey wave. The question was: 'In addition to your parents, do you have someone you trust, and who you turn to for advice?'.

Statistical Analyses

First, descriptive statistics were obtained to gain insight in the means and standard deviations of the studied variables. Next, to answer the research questions, a series of multilevel regression analyses were performed in Mplus 8.7 (Muthén & Muthén, 1998-2017), also referred to as hierarchical linear models, to account for the nested structure of our data. More specifically, two-level models were examined in which measures (Level 1) were nested within participants (Level 2). The intraclass correlation (ICC) at Level 2 was 0.817. We performed four sets of regression analyses. First, in Model 1, we examined the significance of the covariates (participants' level of resilience, age, sex, and living situation). In this model, whether or not participants had a natural mentor and the education level of participants could not be considered as a covariate due to insufficient variance (i.e., 79.5% of participants followed or finished a high level of education and 94.4% had a mentor). Only significant covariates were included in subsequent models. In Model 2, we examined the relation between pandemic duration (time in days) and mental health problems, both without and with covariates (Model 2a and Model 2b, respectively). Next, in Model 3, we tested whether pandemic severity moderated the relation between the duration of the COVID-19 pandemic (time in days) and mental health. Again, we tested this moderator effect without and with covariates (Model 3a and Model 3b). For

interpreting the results at Level 1, the within-person correlated change was used.

In all analyses, $p < .05$ was considered as statistically significant. The effect sizes of models are reported using explained variance (R^2 values); 0.02 was considered small, 0.13 medium, and 0.26 large (Cohen, 1998). Full information maximum likelihood estimation was used to deal with observations with incomplete or missing data. All models were saturated and therefore had a perfect fit, thus, fit statistics are not reported.

Results

Preliminary analyses

Descriptive statistics of the variables of main interest – i.e., pandemic severity and mental health problems - are shown in Table 1 for each measurement wave. Table 1 also reports on the number of participants, the sex distribution, and the mean resilience scores per wave. The average resilience score of the participants varied from 3.94 to 4.15 (see Table 1), corresponding to a score of 'quite a bit' on the 5-point Likert Scale. Although no reliable norm scores were available for the resilience instrument, average scores may indicate fairly high resilience from the perspective of the meaning of scale scores, and because all participants rated themselves at the positive end of the resilience scale.

Table 1

Descriptive statistics for each measurement wave

Wave	Pandemic severity	*n* per wave	Sex distribution	Mental health problems *(M, SD)*	Resilience *(M, SD)*
1	4	161	87.0% female	1.91 (0.65)	4.15 (0.49)
2	4	121	85.1% female	1.84 (0.66)	4.15 (0.49)
3	3	107	85.0% female	1.89 (0.67)	4.12 (0.50)
4	2	98	88.8% female	1.78 (0.56)	4.13 (0.50)
5	1	74	87.8% female	1.78 (0.69)	4.05 (0.49)
6	1	70	87.1% female	1.91 (0.71)	4.05 (0.60)
7	3	62	85.5% female	1.91 (0.68)	4.02 (0.56)
8	4	56	85.7% female	1.94 (0.65)	4.10 (0.56)
9	4	54	87.0% female	1.81 (0.61)	3.94 (0.63)
10	4	54	87.0% female	2.00 (0.63)	4.05 (0.57)

Note. Pandemic severity was expressed as the risk level as stated by the Dutch government (see Appendix 1). Mean mental health problems and mean resilience could vary between 1 and 5.

Model 1: Covariates

The analyses showed that resilience and sex were significant covariates of mental health problems. Resilience was negatively related to mental health problems, indicating that a higher resilience was associated with fewer problems β = -0.49, *SE* = 0.07, p < .001. Females (*M* = 1.93, *SD* = 0.66) reported more problems than males (*M* = 1.54, *SD* = 0.49), β = 0.22, *SE* = 0.07, p = .002, indicating that sex was associated with mental health problems. Therefore, resilience and sex were included as covariates in subsequent analyses. Age and living situation were not significant and thus dropped in consequent analyses (p = .405 and p = .809, respectively).

Models 2a and 2b: Duration of the pandemic and mental health

We examined pandemic duration as predictor of mental health problems in a model without covariates (2a) and with covariates (2b). Model 2a revealed pandemic duration as a significant predictor of mental health problems, β = 0.93, *SE* = 0.05, p = .035. The regression coefficient demonstrated that participants reported more mental health problems as the pandemic progressed. The within-effects of this model were extremely small (R^2 = 0.01). Yet, Model 2b showed that pandemic duration was not a significant predictor of mental health problems when controlling for resilience and sex, β = 0.53, *SE* = 0.04, p = .189. Including these covariates significantly improved model fit, $\Delta\chi^2$ (2) = 32.19, p < .001. The within-effects of this model were medium in size (R^2 = 0.23).

Models 3a and 3b: Pandemic severity as moderator of the association between duration of the pandemic and mental health problems

We examined pandemic severity as a moderator of the association between pandemic duration and mental health problems in a model without covariates (3a) and with covariates (3b). Model 3a revealed that pandemic severity does not significantly moderate the association between pandemic duration and mental health problems, β = -0.29, *SE* = 0.22, p = .181. The within-effects of this model were small (R^2 = 0.02). Similarly, Model 3b showed that pandemic severity was not a significant moderator when controlling for resilience and sex, β = -0.27, *SE* = 0.18, p = .124. Including these covariates significantly improved model fit, $\Delta\chi^2$ (2) = 38.42, p < .001. The within-effects of this model were medium (R^2 = 0.26).

Discussion

This one-year longitudinal study aimed to examine whether the duration of the COVID-19 pandemic was associated with mental health problems in Dutch-speaking late adolescents and young adults from the general population, and whether the severity of the pandemic measures moderated this association. The results suggested that the duration of the pandemic in days since the first lockdown in the Netherlands was not associated with mental health problems, and that the strength of this non-significant association was not influenced by pandemic severity. This implies that pandemic duration was not related more (or less) strongly with mental health problems as the severity of the pandemic measures increased (or decreased). We also found that participants with high levels of resilience reported fewer mental health problems, and that females reported more mental health problems than males. Moreover, both resilience and sex explained more variance in mental health problems than the duration of the pandemic, and therefore seem more important in predicting mental health. In terms of mental health, these results suggest that late adolescents and young adults dealt rather successfully with the COVID-19 pandemic, and the invasive governmental measures that were imposed to protect the population against the spread of COVID-19.

The current results are in line with several other longitudinal studies that were conducted during the first year of the COVID-19 pandemic and found that the mental health of late adolescents and young adults from the general population was not affected by the COVID-19 pandemic (Joensen et al., 2022; Măirean et al., 2023; Van Zyl et al., 2021). The current results also align with a meta-analysis that quantitatively synthesized longitudinal studies from Western countries that examined the impact of the COVID-19 pandemic on the mental health of late adolescents and young adults in the general population (Koning et al., 2024). They found no overall effect of the COVID-19 pandemic on any of the 13 aspects of mental health they examined, including anxiety, depression, and stress, nor any indication of publication bias.

In contrast, a systematic qualitative review including research on mental health changes during the first 8 months of the COVID-19 pandemic showed that most late adolescents and young adults did experience a deterioration of their mental health during the pandemic compared to the pre-pandemic period (Kauhanen et al., 2023). These researchers took a descriptive and qualitative approach to their synthesis of primary research rather than a quantitative as performed by Koning et al. (2024). The systematic review revealed that the deterioration in mental health was worse for females and for those with pre-existing mental health problems (Kauhanen et al., 2023). Other studies also reported a decrease in mental health of late adolescents and young adults, yet this deterioration occurred only during the first few months of the pandemic, but returned

to pre-pandemic levels over the course of 12 through 16 months (Gagné et al., 2021; Graupensperger, Calhoun, Fleming et al., 2022; Graupensperger, Calhoun, Patrick et al., 2022). A similar increase in mental health problems was found in a meta-analysis examining children and youth under 18 (Deng et al., 2023), which synthesized 191 studies and examined (changes in) mental health by examining the prevalence of various mental health problems, such as depression or sleeping problems. They found higher prevalences of mental health problems when comparing results with findings from a previous meta-analysis on pre-pandemic data (Racine et al., 2021), thus suggesting an increase. Additionally, they observed an increase over time during the pandemic, but also reported signs of stabilization and recovery (Deng et al., 2023).

Many of the longitudinal studies only focused on the first months of the COVID-19 pandemic (e.g., Daly et al., 2020; Hamza et al., 2021) instead of the entire first year as the current study does. Additionally, most studies did not measure resilience in addition to mental health problems. The current study shows resilience is an important factor when examining mental health. The present study comprised of a sample which reported high resilience scores, which is in line with overview studies that show Dutch youth are generally doing better internationally in terms of life satisfaction, general wellbeing, and their social context (Boer et al., 2022). This may explain why no deterioration in mental health was found.

Taken together, the current study, the longitudinal studies, the systematic review (Kauhanen et al., 2023), and the meta-analyses (Deng et al., 2023; Koning et al., 2024) provide no conclusive evidence whether mental health of late adolescents and young adults from the general population in Western countries was affected over the course of the first year of COVID-19. However, the possible long-term effects of the COVID-19 pandemic on mental health remains unclear. To our knowledge, there are no longitudinal studies available that examined the mental health of late adolescents and young adults from the general population during the full three pandemic years, which makes it difficult to draw conclusions about the long-term effects. Therefore, conclusive or robust evidence that the COVID-19 pandemic affected the mental health of late adolescents and young adults from the general population in the long run remains scarce, although research showing no negative short-term effects is accumulating (i.e., Knowles et al., 2022; Stamatis et al., 2022).

Strengths and Limitations

This study has various strengths, the first being that the study is longitudinal even though it only covered the first year of the pandemic. As such, this study adds to the literature as most studies on mental health of young people during COVID-19 were cross-sectional (i.e., Al Omari et al., 2020; Koning et al., 2021; Rauschenberg et al., 2021). Second, this study focused on a mixed age group, which is underrepresented in research on the effects of COVID-19 on the mental health of youth. In the current sample of participants (aged 16-24 years) there are both students who attended school or college and those who were already employed. This increases generalizability, as most studies only focused on adolescents (10-18 years), students, or on (working) adults (18 years or older). Third, this study took the severity of the imposed measures into account, as it was reasoned that stress intensity may depend on the severity of measures.

This study has also some limitations. The main limitation is that a substantial part of the sample consisted of highly educated females, which limited the generalizability of the results to males and young people with lower levels of education. This is particularly the case, as empirical evidence showed that females were more at risk of mental health problems during the COVID-19 pandemic than males (Kauhanen et al., 2023). Second, we experienced a high level of drop-out from the first (wave 1) to the last measurement (wave 10; about 80%). Additionally, there was only a limited number of participants who filled out the questionnaire in each wave, leading to missing data. This limited generalizability as well. Yet, we were able to use all data from youth participating in at least two measurement waves by using a hierarchical or multilevel analysis approach in which waves were nested within participants. Third, the data were obtained in only the first year of the COVID-19 pandemic, whereas the full pandemic lasted over three years (11 March 2020 – 5 May 2023; World Health Organization, 2024). Therefore, the results of this study cannot be generalized to the full course of the COVID-19 pandemic. It may be that a mental health effect was absent during the first year of the pandemic, but that the pandemic might have taken its toll on the mental health of late adolescents and young adults in the long run – although there is no confirming evidence to this to date. Longitudinal data obtained during the entire duration of the pandemic need to be analyzed to draw more firm conclusions. Last, the first measurement wave of this study took place after the spread of COVID-19 had already been declared a pandemic. Therefore, no pre-pandemic data were available, and no conclusions can be drawn about changes in mental health before and during the pandemic.

Implications

The results of this study have practical implications for policymakers and clinical practice. First, the current results suggest that the mental health of late adolescents and young adults in the general population was not affected by the duration of the pandemic, and that this association was not influenced by the severity of the pandemic. Therefore, the preventive measures taken by the Dutch government to prevent the spread of the COVID-19 may have been justified from a mental health perspective, but more information from other perspectives (e.g., medical or economical) is needed to draw conclusions about justification. The preventive measures that were put in place to contain the spread of COVID-19 saved many lives of particularly the most vulnerable (e.g., Deb et al., 2020; Talic et al., 2021), while on average, these measures did not affect the mental health of late adolescents and young adults of the general population. These youth may have been sufficiently resilient to deal with the invasiveness and the duration of the preventive measures. This could explain why the current study did not find an increase in mental health problems, as the sample showed high resilience scores. However, it is important to stress that there is empirical evidence suggesting that youth from clinical populations did suffer from preventive measures that were taken during the COVID-19 pandemic (Fischer et al., 2023; Kleine et al., 2023; Zijlmans et al., 2023).

Conclusion

This study did not find that the mental health of Dutch late adolescents and young adults from the general population deteriorated during the first year of the COVID-19 pandemic. Also, no evidence was found that this association was influenced by the severity of the measures that were imposed by the Dutch government to contain COVID-19. The adolescents and young adults in this study showed rather high levels of resilience, which may have helped them in coping with the pandemic and the measures, and may have buffered against the development of mental health problems. Our findings suggest that the COVID-19 pandemic did not have short-term negative effects on mental health of young people, but it seems evidence concerning this topic is not univocal. Future research could expand on the potential role that resilience may have played during COVID-19, which may be useful for guiding mental health policy and care in stressful situations such as a pandemic.

Appendices

Appendix 1

Specific dates and risk level for each measurement wave

Measurement wave	Date	Risk Level
1	1 April 2020 – 15 April 2020	4
2	24 April 2020 – 30 April 2020	4
3	14 May 2020 – 20 May 2020	3
4	11 June 2020 – 17 June 2020	2
5	6 July 2020 – 12 July 2020	1
6	14 September 2020 – 20 September 2020	1
7	20 October 2020 – 26 October 2020	3
8	16 December 2020 – 22 December 2020	4
9	27 January 2021 – 02 February 2021	4
10	31 March 2021 – 13 April 2021	4

Chapter 6

General Discussion

This dissertation aimed to examine the mental health and the compliance of late adolescents and young adults during the COVID-19 pandemic, and the factors that may have influenced mental health and compliance (e.g., resilience and the availability of natural mentors). Four studies were conducted to meet these aims, of which two focused on compliance with the preventive COVID-19 measures, whereas the other two focused on mental health. The first study (Chapter 2) was an explorative cross-sectional study, examining which factors (e.g., mental health) were associated with the compliance to the COVID-19 measures in a sample of 263 Dutch late adolescents and young adults from the general population. Chapter 3 presented a qualitative interview study that was conducted to gain more insight in to what extent and why late adolescents and young adults comply with the COVID-19 measures, and whether their mental health and having a natural mentor influenced their compliance. The next chapter (4) presented a three-level meta-analysis, which examined the effects of the first year of the COVID-19 pandemic on (multiple aspects of) the mental health of late adolescents and young adults (16-30 years). Finally, chapter 5 presented a longitudinal multi-level study that examined the effects of the duration of the COVID-19 pandemic on the mental health of late adolescents and young adults from the general population. This study also examined the potential moderating effect of pandemic severity. In this final chapter, the main findings of these four studies are summarized and discussed in twofold. First, primary findings on compliance with the COVID-19 measures and mental health are discussed, after which these findings are integrated into an overall view. Further, limitations, strengths, and implications of the studies and their results are discussed. Finally, this chapter ends with the main conclusions.

Main Findings

Compliance

The first two studies on compliance to the COVID-19 measures aimed to gain more insight into how well late adolescents and young adults comply, why they comply, and which factors were associated with compliance.

The first study (Chapter 2) showed that compliance with social distancing measures was associated with less depressive symptoms, less distrust towards others, more resilience, applying active copies strategies, and having a natural mentor. Age and sex did not moderate these associations. This study also showed that most late adolescents and young adults generally adhered to all preventive measures (e.g., washing hands frequently) (84.8%), and social distancing in particular (85,9%). These findings show that most late adolescents and young adults complied with the COVID-19 measures, and

that multiple factors may influence compliance (e.g., more depressive symptoms can negatively impact compliance).

The results on the degree of compliance were confirmed in the second qualitative study (Chapter 3), showing that most late adolescents and young adults complied with the COVID-19 measures. The participants gave various reasons for their compliance: 'feeling solidarity with others' and 'feeling responsible for others' were the most frequently given arguments for compliance. This study also indicated that the participants experienced mental health problems, although positive outcomes were also identified, such as having more time for hobbies. Last, having a natural mentor proved to be positively associated with adherence to the COVID-19 measures.

It seems that late adolescents and young adults adhered to the preventive measures quite well. This is in line with other studies, including a review study, showing an overall high compliance in adolescents and young adults with the COVID-19 measures (Jaureguizar et al., 2021), even though self-reported compliance was generally higher than observed compliance (Selby et al., 2020). The other-directed instead of self-oriented reasons for compliance (i.e., 'feeling solidarity with others' and 'feeling responsible for others') can possibly be partly understood from the perspective that late adolescents and young adults themselves were not at risk of severe complaints of the COVID-19 virus (World Health Organization, 2023). Moreover, in their stage of development most adolescents and young adults have acquired the sociomoral competence of empathizing with others (Gibbs et al., 2007) indicating that they are capable of taking the perspectives of others and being emotional responsive to the situation of others. Given this competence, an important incentive for adolescents and young adults to adhere to the measures was to protect others, and specifically more vulnerable people such as those with pre-existing medical conditions. Other studies found similar results, with adolescents reporting 'social responsibility' as their reason for compliance to prevent others from getting sick (Alivernini et al., 2021; Craig et al., 2023; Oosterhoff et al., 2020). The current qualitative study also revealed that the dimensional size of physical environments acted as a facilitator for compliance, meaning that late adolescents and young adults were more likely to comply to social distancing measures in physical environments of substantial size (e.g., more likely to comply in a spacious supermarket than in a cramped supermarket).

Other factors that positively influenced the compliance with the COVID-19 measures in late adolescents and young adults were fewer mental health problems, the availability of a natural mentor, greater resilience, and using active coping strategies. This is in line with other studies, showing that fewer mental health problems were related to higher compliance (e.g., Magson et al., 2021; Solomou & Constantinidou, 2020). Additionally, social support (whether or not in the form of a natural mentor) can be

beneficial to the promotion of health behavior, such as compliance with the preventive COVID-19 measures (Kwasnicka et al., 2016). One study found that social support from family members increased compliance, but that social support from friends decreased compliance (Paykani et al., 2020). This may be explained by the increased (social) pressure from friends to ignore the preventive measures to engage in (physical) contact with people outside of their household (e.g., to leave one's house to meet up). Further, higher levels of resilience were positively associated with compliance, which is in line with other studies (Hassanien et al., 2022; Kaim et al., 2021). Active coping strategies were also positively associated with compliance, which has also been found in several studies (Alyami et al., 2021; Kleitman et al., 2021). Last, studies found that providing sufficient (understandable) information about the COVID-19 virus positively affected compliance, while lack of or incorrect information may cause mistrust (e.g., in the government), which can hinder compliance (Nivette et al., 2021; Raude et al., 2020). In sum, the current two studies on compliance (Chapters 2 and 3) align with the results of other studies and show that compliance was fairly high in late adolescents and young adults, and was influenced by various factors, which affected to what extent late adolescents and young adults were willing to comply with the preventive measures.

Mental health

After gaining insights into compliance during the COVID-19 pandemic and its relation with mental health problems, the effects of the COVID-19 pandemic on the mental health of late adolescents and young adults were examined. To achieve this, a three-level meta-analysis (Chapter 4) was first conducted, which synthesized longitudinal studies that had at least one pre-COVID measure and at least one measure during the first year of the COVID-19 pandemic. Mental health was operationalized as thirteen different mental health aspects that were referred to as mental health "domains" (e.g., depression or anxiety). These domains were subsequently merged into two overarching categories: internalizing and externalizing symptoms. The results showed that the COVID-19 pandemic did not have a significant effect on any of the thirteen mental health domains nor on the two overarching categories, indicating that mental health of late adolescents and young adults from the general population did not worsen or improve during the first year of the COVID-19 pandemic.

To gain insight into potential effects of the COVID-19 pandemic on the mental health of late adolescents and young adults, a longitudinal multi-level study (Chapter 5) was conducted that examined whether the duration of the COVID-19 pandemic affected mental health, and whether pandemic severity moderated this relation. The results

showed that the mental health of late adolescents and young adults from the general population in the Netherlands was not affected by the duration of the COVID-19 pandemic, and that pandemic severity was not a moderator. Additional results showed that females experienced more mental health problems than males, and that higher resilience was associated with fewer mental health problems.

When combining the results from both studies, it seems that mental health of late adolescents and young adults from the general population from Western countries did not deteriorate during the first year of the COVID-19 pandemic. This was unexpected, since multiple studies provided evidence of mental health deterioration during other pandemics due to measures such as quarantine (Brooks et al., 2020; Hawryluck et al., 2004; Huremović, 2019; Loades et al., 2020), and because many researchers expressed their worries about the impact of social distancing measures on mental health (e.g., Cullen et al., 2020; Sahu, 2020; Usher et al., 2020). While research on the effects of the COVID-19 pandemic on mental health is still accumulating, it seems that findings on the potential effects of the COVID-19 pandemic and its associated preventive measures on the mental health of late adolescents and young adults are at least equivocal.

When looking at recent studies, more and more seem to report on negative effects of the COVID-19 pandemic on the mental health of late adolescents and young adults (e.g., Kauhanen et al., 2023; Marra et al., 2024). There are, however, also studies reporting that the COVID-19 pandemic did not influence mental health (Knowles et al., 2022; Stamatis et al., 2022; Van der Velden et al., 2022). Additionally, there are studies that provide mixed results across mental health problems, such as an increase in anxiety but a decrease in depression (Hawes et al., 2021; Lee et al., 2020; McLafferty et al., 2021; Wieman et al., 2022). There are also studies reporting a deterioration of mental health during the first period or lockdown of the COVID-19 pandemic, which stabilized or returned to baseline over time (Deng et al., 2022; Gagné et al., 2021; Graupensperger et al., 2022). Last, when looking at available research that focused on specific groups, such as those with pre-existing mental health issues, the COVID-19 pandemic seemed to have had a strong negative impact on their mental health (Fischer et al., 2023; Kauhanen et al., 2023; Kleine et al., 2023; Zijlmans et al., 2023).

All of this shows that research that examined potential effects of the COVID-19 pandemic on the mental health of late adolescents and young adults is not univocal. At the time this dissertation was written, there were still no studies available that longitudinally examined the mental health of late adolescents and young adults and that included measures before and after the COVID-19 pandemic. Therefore, it remains unclear whether the COVID-19 pandemic did have long term effects on the mental health of late adolescents and young adults. Furthermore, studies show that even before the

COVID-19 pandemic a trend indicating an increase of mental health problems in children and adolescents was reported, and therefore the COVID-19 pandemic may not have been the (sole) cause of an increase in mental health problems, if an increase was found at all (Abrams, 2023; Boer et al., 2022; CBS, 2018).

Considering the theoretical frameworks of identity development and self-determination, it is likely that the limited social contact during the COVID-19 pandemic could have had a negative impact on mental health. Additionally, the current longitudinal study identified being female as a risk factor, which aligns with previous studies (Kleine et al., 2023; Magson et al., 2021; Thorisdottir et al., 2021; Stevens et al., 2024) and the finding that females tend to be more prone to developing mental health problems than males (Boyd et al., 2015; Seedat et al., 2009). However, protective factors may act as a buffer against developing mental health problems. This dissertation revealed some of these factors.

The most influential factor seemed to be resiliency. There is a great body of literature, including reviews and meta-analyses, highlighting the importance of resilience in preventing mental health problems (e.g., Gheshlagh et al., 2017; Hu et al., 2015). Following the process-oriented approach, resilience is best seen as a dynamic process in which individuals actively adapt to major adversities and, when successful, overcome them (Fergus & Zimmerman, 2005). In this light, whenever individuals have sufficient assets or resources (i.e., protective factors) to successfully adapt to a major adversity (e.g., the COVID-19 pandemic), they can overcome the adverse situation. If insufficient protective factors are present to mitigate the risk factors, individuals may be unsuccessful in adapting to the situation and experience the negative outcomes/risks associated with the adverse situation (e.g., developing mental health problems due to limited social contact during the COVID-19 pandemic). Additionally, social support, particularly in the form of a natural mentor seemed to be a protective factor. This is in line with a substantial body of literature stating that social support is associated with fewer mental health problems (Budimir et al., 2021; Harandi et al., 2017; Heerde & Hemphill, 2018). The availability of a natural mentor, who can provide social support, is also associated with fewer mental health problems (Hurd & Zimmerman, 2010; Hurd & Zimmerman, 2014; Van Dam et al., 2018). Having a natural mentor can also contribute to greater resilience, which is, as stated earlier, also related to fewer mental health problems (Southwick et al., 2007; Van Dam & Schwarz, 2020). Last, being able to use active coping strategies as the main strategy to deal with difficult situations was associated with fewer mental health problems, which is also in line with a great body of studies. Active coping, problem-focused, or task-oriented coping are associated with fewer mental health problems, whereas emotion-oriented coping and/or avoidance coping are related with more mental health problems (Budimir et al., 2021;

Flett et al., 2012). Furthermore, active coping strategies have been shown to be positively associated with resilience, with resilient adolescents using active coping strategies more frequently than those with lower resilience levels (Dumont & Provost, 1999).

In sum, the effect of the COVID-19 pandemic on the mental health of late adolescents and young adults remains uncertain, with contrasting results across studies. Some risk factors for developing mental health problems during the COVID-19 pandemic, such as being female or having pre-existing mental health problems, were identified in several studies. Additionally, many factors may have influenced the relation between the COVID-19 pandemic and mental health, and some could have acted as buffers, such as social support or resilience. These factors also may have influenced each other (e.g., having a natural mentor being beneficial for resilience), indicating mental health is a complex and multifaceted construct.

Overarching perspective

When taking both the results on compliance and mental health into consideration, it remains unclear how the mental health of late adolescents and young adults was associated with compliance. It is possible that those with (pre-existing) mental health problems had more trouble with compliance due to insufficient 'resources' (i.e., physical and psychological assets) as described in the maintenance of behavior change theory (Kwasnicka et al., 2016). When one's 'resources' are limited or depleted, this can hinder one's self-regulatory capacities. Compliance with preventive (social distancing) measures may also increase the risk of developing mental health problems due to severely limited opportunities for social interaction (Loades et al., 2020). Another study found that a high compliance group showed more depressive symptoms than a low or medium compliance group (Coulaud et al., 2023). On the contrary, one study found that adherence to stay-at-home measures protected against mental health problems (Magson et al., 2021). For instance, social anxiety symptoms may have been decreased because of compliance with stay-at-home measures (Hawes et al., 2021). As social gatherings were generally not allowed, and social distancing measures prevented crowd forming, social anxiety was not or or only somewhat induced by these situations. However, there are studies that did not find a relation between compliance and mental health (Padrosa & Bolíbar, 2022). The current dissertation shows that compliance seems to be related with mental health, but does not provide a clear view on how compliance is related to (various) mental health problems, while international literature offers mixed results.

Strengths and Limitations

The outcomes of this dissertation should be considered in light of several limitations. The first was that most studies were based on self-reported data, which could have biased the results. For instance, studies have shown that self-reported compliance tends to be higher than observed compliance (Selby et al., 2020). This could be due to social-desirability bias in answering the survey. Due to the nature of the COVID-19 pandemic, obtaining observation data for compliance was difficult due to the lockdown and social distancing measures.

A second limitation was that this dissertation only focused on the first year of the COVID-19 pandemic, and therefore no claims could be made about potential long-term effects of the COVID-19 pandemic. It could be that, due to pandemic fatigue, the longer the COVID-19 pandemic existed, the higher the risk of developing mental health problems. This may have particularly been the case since the preventive measures were constantly changing with relaxations and restrictions following each other. At the time of writing, there were still insufficient published studies available on the full duration of the COVID-19 pandemic that should be better able to grasp the effect of the COVID-19 pandemic on the mental health of late adolescents and young adults.

A third limitation was that this dissertation focused on Dutch-speaking populations in the Netherlands (with exception of the meta-analysis). During the COVID-19 pandemic there were different preventive measures in place across countries at different times. What type of measures were taken depended on the virus spread with more infections leading to additional measures and less infections leaving space for relief of measures. Therefore, the results are difficult to generalize since measures differed across countries in the same period of time. For example, the Netherlands had a curfew from January 2021 to the end of April 2021, while the US did not have a curfew in the same period (RIVM, n.d.; CDC, n.d.). This illustrates that the situation across countries was incomparable during the same period of time.

Despite these limitations, this dissertation also has its strengths. It examined both compliance and mental health during the COVID-19 pandemic using various research designs (i.e., a cross-sectional design, a qualitative design, a meta-analytical design, and a longitudinal design), providing a multi-faceted insight in these constructs and increasing robustness.

In addition, the focus on late adolescents and young adults (16 to 24 years) also provides an insight in a somewhat understudied population. It seems more common to study children and adolescents (0 to 18 years) or adults (18 years and older). The population of late adolescents and young adults constitute a heterogenous group, consisting of both students and working young people. Additionally, they are in a specific

developmental phase, which is different from both children and adults. Therefore, the results of the present dissertation complement the results of other studies examining different populations.

Last, this dissertation studied multiple relevant factors to gain a better understanding of the effects of the COVID-19 pandemic on late adolescents and young adults, such as resilience and having a natural mentor. These factors emphasize that the effects of the COVID-19 pandemic on mental health are complex and depend on multiple factors, which could buffer or exacerbate the effects.

Implications

The implications of this dissertation are mainly focused on policy, as the COVID-19 pandemic ended on May 5, 2023, (World Health Organization, 2024). The results of this dissertation show that late adolescents and young adults from the general population complied quite well with the preventive COVID-19 measures, and that their mental health remained rather stable during the first year of the pandemic. This indicated that the preventive measures that were imposed by the Dutch government may be justified from a mental health perspective (in late adolescents and young adults from the general population), considering these measures 'flattened the curve' of the spread of COVID-19 and prevented hospitalizations and even death while not affecting the mental health of late adolescents and young adults from the general population. To fully answer whether the preventive measures were justified other perspectives should also be considered, such as the medical and economical perspective. Additionally, it may be assumed that the governmental communication on the measures they imposed, was adequate, since compliance was quite high. Studies show that compliance also depended on how the information was provided, as it should be understandable and sufficient (Liao et al., 2010; Nivette et al., 2021; Raude et al., 2020). The COVID-19 pandemic was a turbulent time with many uncertainties. Giving as much adequate information and clarity as possible can prevent distrust and provide some tranquility.

However, the Dutch government could also improve. At the start of the COVID-19 pandemic, the 'Outbreak Management Team (OMT)' comprised various health care experts (such as virologists) to advise the government in the actions that were necessary to take to 'flatten the curve'. For a substantial period of time, the OMT did not include health professionals with expertise in the mental health of children, youth, adults, and/or elderly and mainly comprised medical staff and microbiologists. Therefore, there was sufficient expertise in how to prevent the COVID-19 virus from spreading, but insufficient expertise in potential side-effects of measures on mental health of different populations.

In future pandemics, experts in mental health (e.g., psychiatrists or psychologists) should be consulted to ensure that the mental health perspective is taken into account.

Last, the government should be considerate of those who are more at risk of developing mental health problems (e.g., females) or those whose problems could worsen (e.g., those with pre-existing mental health issues) during a situation such as the COVID-19 pandemic. This dissertation showed that resilience and social support (availability of a natural mentor) could act as buffers. Therefore, the Dutch government should be mindful of people who may need additional support in crisis situations that require drastic measures, for instance by supporting mental health organizations and initiatives directed to offering social support, resiliency programs, and easily accessible mental health care.

Conclusions

Taken together, this dissertation provides insight into the compliance and mental health of late adolescents and young adults from the general population during the first year of the COVID-19 pandemic. Overall, it seemed that they complied very well to the preventive (social distancing) measures, and therefore contributed to reducing the incidence of the COVID-19 virus. It was also found that various factors may have influenced compliance to measures, such as mental health. Overall, the present dissertation did not find an effect of the COVID-19 pandemic on the mental health of late adolescents and young adults in the first year of the pandemic. As such, this dissertation provides a critical look on the dominating view of the negative effect the COVID-19 pandemic had on the mental health of late adolescents and young adults. It highlights that not everyone was negatively affected by the COVID-19 pandemic, as some even experienced positive outcomes. The results of this dissertation, however, cannot be generalized to all individuals. Multiple factors may have buffered potentially negative effects of the COVID-19 pandemic, such as resilience or social support (whether or not in the form of a natural mentor). On the contrary, factors such as being female or having pre-existing mental health problems may have been risk factors for developing or worsening mental health problems. That being said, the measures taken by the Dutch government, which aimed to reduce the incidence of COVID-19 and save lives, may not have had a severe negative impact on the mental health of late adolescents and young adults from the general population. However, this dissertation cannot draw any conclusions about the legitimacy of the preventive measures. If any conclusion is to be drawn, it should be based on multiple points of view. This dissertation does provide valuable insights that contribute to this discussion.

During the COVID-19 pandemic everybody had to improvise to make the best of the situation (e.g., watching movies online together with friends or working from home). Furthermore, everybody youth had to continuously adapt to everchanging circumstances, which were shaped by the spread of COVID-19 and the measures that were imposed to reduce the virus spread. The question is whether late adolescents and young adults did overcome the COVID-19 pandemic. This dissertation cannot provide a conclusive answer, but does provide valuable empirical information. It seems that mental health was not severely impacted in the general youth population during the first year, but long-term effects cannot be ruled out. Additionally, the effects of the COVID-19 pandemic may have been different for various subsamples (e.g., those with pre-existing mental health problems), and it is therefore plausible to suggest that not every individual did overcome the difficulties of the COVID-19 pandemic. Resilience is a dynamic and multisystemic concept, which pertains to how individuals and their social environments interact to adapt to minor and major stress-inducing life events. This dissertation (with the backing of international literature) indicates that societies should focus on enhancing resilience to ensure youth (and possibly other age groups as well) can adapt and overcome stressful life events, such as the COVID-19 pandemic, and in pursuance to prevent mental health problems.

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Summary

Improvise, Adapt, Overcome?

The Mental Health and Compliance of Youth During the COVID-19 Pandemic

When the COVID-19 virus infected the first victims in December 2019 in China, the dramatic and far-reaching worldwide consequences could not be foreseen at that time. As the virus spread quickly across the globe, the Centers for Disease Control and Prevention – which is the national public health agency of the United States - declared the COVID-19 outbreak as a pandemic on 11 March 2020, and subsequently demanded national and global mitigation measures. Worldwide, governments imposed drastic measures to decrease the incidence of the COVID-19 virus, of which social distancing measures were among the most invasive measures to prevent further virus spreading. Due to the preventive measures severely limiting daily lives (e.g., social interaction), people improvised to make the most out of the situation (e.g., working from home and organizing online movie nights).

Following the instigation of preventive measures, researchers started discussing the potential negative and positive effects these measures might have on mental health. Particularly late adolescents and young adults seemed to be at risk for developing mental health problems during the COVID-19 pandemic due to their developmental stage, in which social interaction is of vital importance. The current dissertation aimed to gain more insight into the extent to which late adolescents and young adults complied to the imposed preventive measures, the effects of the COVID-19 pandemic on their mental health, and the factors that could have influenced their mental health and compliance. To meet these aims, four studies were conducted of which two mainly focused on compliance and two on mental health.

The first study (Chapter 2) was an explorative cross-sectional study. The data for this study were collected during the first wave and first lockdown of the COVID-19 pandemic in the Netherlands (April 2020). This study examined what factors were associated with adherence to COVID-19 measures in a sample of Dutch youth (N = 263; 79.8% female) who were between 16 and 24 years old (M = 21.1 years; SD = 2.44 years), and who completed an online questionnaire with questions on their compliance with preventive measures, resilience, coping strategies, mental health, and the availability of a natural mentor. The results showed that late adolescents and young adults complied quite well with all preventive measures (84.8%), and with social distancing measures in particular (85.9%). Furthermore, it was found that adolescents and young adults adhered better to social distancing measures as they reported fewer depressive symptoms. Youth who showed less distrust, higher levels of resilience, and those using an active coping strategy or having a natural mentor more often complied with COVID-19 measures. Age and sex did not moderate these relations.

The second study (Chapter 3) was a qualitative interview study, which examined to what extent and why Dutch youth complied with the COVID-19 social distancing measures, and whether their mental health and the availability of a natural mentor influenced their

compliance. Data were collected using semi-structured interviews with questions about how well they did comply with the measures taken by the government, the reasons for (non-)compliance, the availability of a natural mentor, and the mental health of the participants during the first year of the COVID-19 pandemic (late May – early June 2020). The sample consisted of 35 late adolescents and young adults (48,6% female) between 16 and 25 years old (M = 19.6, SD = 2.86). The results showed that the 35 participants complied very well with social distancing measures, and that feelings of solidarity with others and feeling responsible for others were most important for compliance. The results further revealed that the participants experienced mental health issues (such as anxiety or loneliness) during the COVID-19 pandemic, but they also mentioned positive outcomes, such as more time for hobbies. Last, having a natural mentor was positively related to compliance with social distancing measures, which was ascribed to the support of their natural mentor and the possibility to talk with their natural mentor about the measures.

The third study (Chapter 4) was a three-level meta-analysis that focused on the effects of the COVID-19 pandemic and its accompanying measures on the mental health of late adolescents and young adults. In this review, mental health was operationalized as thirteen mental health domains (e.g., anxiety symptoms, depression symptoms, stress symptoms, sleeping problems, loneliness, and multiple variants of substance abuse) and also included a category of positive psychological attributes (life satisfaction, positive affect, and self-efficacy). These thirteen mental health domains were merged into two overarching categories, of which one referred to internalizing symptoms and the other to externalizing symptoms. A total of 22 studies could be included from which 105 effect sizes could be extracted. This meta-analysis only included studies with at least one pre-COVID-19 measure, and one measure during the COVID-19 pandemic. Therefore, there is presumably dependency in the data, since nearly all participants were their own control. To account for this dependency, calculated effect sizes were transformed using a specific formula that incorporates the correlation between assessments. We used a correlation that was based on literature (expected correlation), an 'extreme' correlation (close to 1) and no correlation at all (data independency). Results showed that the COVID-19 pandemic did not have an effect on any of the thirteen aspects of the mental health of late adolescents and young adults as well as on the overarching categories. This was the case for all used correlations (expected, extreme and no correlation at all).

The fourth and final study of this dissertation (Chapter 5) was a longitudinal study that examined the effects of the duration of the COVID-19 pandemic on the mental health of late adolescents and young adults from the general population. This study also tested the moderating effect of pandemic severity on the relation between pandemic duration and mental health. In ten measurement waves, data were collected during the first year of the

COVID-19. During each wave, the preventive measures were either increased or relaxed by the government. The final sample comprised N = 161 late adolescents and young adults from the Netherlands (M_{age} = 21.17, SD_{age} = 2.38, 87% female), and consisted of participants who filled in the questionnaire at wave 1 and at least one other wave. When controlling for resilience and sex, it was found that the duration of the pandemic was not associated with mental health, and that pandemic severity did not moderate this relation. It was also found that females reported more mental health problems and that greater resilience was associated with fewer mental health problems.

Taken together, the study results of Chapters 2 and 3 showed that late adolescents and young adults complied quite well with the preventive measures, which may have contributed to reducing the incidence of the COVID-19 virus. The studies also identified various factors that influenced compliance, namely mental health, resilience, coping strategies and the availability of a natural mentor. Moreover, the studies provided an insight into the reasons for compliance of late adolescents and young adults, such as 'feeling responsible for others'.

The studies in Chapters 4 and 5 particularly showed that the mental health of late adolescents and young adults seemed unaffected by the COVID-19 pandemic and its accompanying measures. International studies are equivocal regarding the effects the COVID-19 pandemic may have had on the mental health of late adolescents and young adults. Some studies concluded that the COVID-19 pandemic increased mental health symptoms (and in some cases returned to pre-pandemic levels over time), whereas other studies showed that COVID-19 had mixed effects on mental health (e.g., an increase in depression symptoms and a decrease in anxiety symptoms) or no effect at all.

This dissertation uniquely contributed to the ongoing discussion about the mental health of adolescents and young adults during COVID-19, and its association with resilience, the availability of a natural mentor, and compliance. Resilience seemed to be a key factor to protect against the development of mental health problems in the first year of the COVID-19 pandemic. In the longitudinal study, females showed more mental health problems than males. Finally, a relation between compliance and mental health of late adolescents and young adults may exist, but it remains unclear how they can affect each other.

In conclusion, this dissertation provides valuable insights into the compliance and the mental health of late adolescents and young adults during the COVID-19 pandemic. Overall, it seemed that they complied rather well to the preventive (social distancing) measures, and therefore may have contributed to reducing the incidence of the COVID-19 virus. It was also found that various factors may have influenced compliance to measures, such as mental health. Overall, the present dissertation did not find evidence that the

COVID-19 pandemic affected the mental health of late adolescents and young adults in the first year of the pandemic. As such, this dissertation provides a critical look on the dominating view that the COVID-19 pandemic had a negative effect on the mental health of late adolescents and young adults. Furthermore, it provides an insight into the various factors that may have acted as buffer or risk factor for developing mental health problems during the COVID-19 pandemic.

During the COVID-19 pandemic everybody had to continuously improvise and adapt to everchanging circumstances, which were shaped by the spread of COVID-19 and the measures that were imposed to reduce the virus spread. The question is whether late adolescents and young adults did overcome the COVID-19 pandemic. This dissertation cannot provide a conclusive answer but does provide valuable empirical information. It seems that mental health was not severely impacted in the general population of late adolescents and young adults during the first year of COVID-19, but long-term effects cannot be ruled out. Additionally, the effects of the COVID-19 pandemic may have been different for various subsamples (e.g., those with pre-existing mental health problems), and it is therefore likely that specific groups of individuals did not overcome the difficulties of the COVID-19 pandemic. Resilience seemed to be a key factor in protecting against the development of mental health problems, and therefore this dissertation aligns with international literature indicating that societies should focus on enhancing resilience in youth so that they are better equipped to adapt to and overcome stressful life events, such as the COVID-19 pandemic, and to pursue the prevention of the development of mental health problems.

Samenvatting (Dutch Summary)

Improviseren, Aanpassen, Overwinnen?

De mentale gezondheid en regelnaleving van jongeren tijdens de COVID-19-pandemie

Toen in december 2019 de eerste mensen in China geïnfecteerd raakten met het COVID-19-virus, konden de ingrijpende en verstrekkende wereldwijde gevolgen op dat moment niet worden voorzien. Naarmate het virus zich snel over de wereld verspreidde, verklaarden de Centers for Disease Control and Prevention (CDC) – de nationale volksgezondheidsinstantie van de Verenigde Staten – op 11 maart 2020 de COVID-19-uitbraak tot een pandemie en eisten daarop nationale en wereldwijde preventieve maatregelen om verdere verspreiding te beperken. Wereldwijd legden regeringen ingrijpende maatregelen op om de verspreiding van het COVID-19-virus in te dammen, waarvan 'social distancing' het meest ingrijpend was (d.w.z., het vermijden van drukte; het beperken van sociale bijeenkomsten, sociale contacten, en de mogelijkheid om bij elkaar te komen; en het fysiek afstand houden van anderen met de anderhalve-meter-afstandsregel als het meest kenmerkende voorbeeld). Omdat de preventieve maatregelen het dagelijks leven ernstig beperkten (e.g., een sterke vermindering in het aantal sociale interacties), improviseerden mensen om er het beste van te maken door bijvoorbeeld thuis te werken en online (sociale) activiteiten te organiseren.

Na de invoering van preventieve maatregelen om de virusverspreiding in te dammen laaide tussen wetenschappers een discussie op over mogelijke negatieve en positieve effecten van deze maatregelen op de mentale gezondheid van de bevolking. Vooral late adolescenten (16 tot 22 jaar) en jongvolwassenen (18 tot 24 jaar) leken het risico te lopen om mentale gezondheidsproblemen te ontwikkelen tijdens de COVID-19-pandemie vanwege hun ontwikkelingsstadium waarin sociale interactie cruciaal is. Het doel van dit proefschrift was om meer zicht te krijgen op de mate waarin late adolescenten en jongvolwassenen zich hielden aan de opgelegde preventieve maatregelen, de effecten van de COVID-19-pandemie op hun mentale gezondheid, en de factoren die hun mentale gezondheid en naleving van maatregelen mogelijk beïnvloedden. Om dit doel te bereiken werden vier studies uitgevoerd, waarvan twee zich hoofdzakelijk richtten op de naleving van maatregelen en twee op de mentale gezondheid.

De eerste studie (hoofdstuk 2) was een exploratief cross-sectioneel onderzoek waarvan de data werden verzameld tijdens de eerste golf en de eerste lockdown van de COVID-19-pandemie in Nederland (april 2020). Deze studie onderzocht welke factoren samenhingen met de naleving van de door de overheid opgelegde maatregelen in een steekproef van Nederlandse jongeren (N = 263; 79,8% vrouw) met een leeftijd tussen de 16 en 24 jaar (M = 21,1; SD = 2,44). Deze jongeren vulden een online vragenlijst in met vragen over hun naleving van de maatregelen, veerkracht, copingstrategieën, mentale gezondheid en de beschikbaarheid van een natuurlijke mentor. De resultaten toonden aan dat late adolescenten en jongvolwassenen zich behoorlijk goed aan alle preventieve maatregelen hielden in het algemeen (84,8%) en in het bijzonder aan

'social distancing' (85,9%). Bovendien bleek dat late adolescenten en jongvolwassenen zich beter aan 'social distancing' hielden naarmate ze minder depressieve symptomen rapporteerden. Jongeren die minder wantrouwend waren, veerkrachtiger waren, een actieve copingstrategie gebruikten of een natuurlijke mentor hadden, hielden zich beter aan de COVID-19-maatregelen. Deze bevindingen werden niet beïnvloed door leeftijd en geslacht van de participanten.

De tweede studie (hoofdstuk 3) was een kwalitatieve interviewstudie waarin werd onderzocht in hoeverre en met welke redenen Nederlandse jongeren zich aan 'social distancing' hielden. Daarnaast werd onderzocht of hun mentale gezondheid en de beschikbaarheid van een natuurlijke mentor invloed had op de naleving. De data werden verzameld door semigestructureerde interviews af te nemen bij jongeren waarin vragen werden gesteld over hoe goed zij zich hielden aan de door de overheid opgelegde maatregelen, de redenen voor het wel of niet naleven van deze maatregelen, de beschikbaarheid van een natuurlijke mentor en de eigen mentale gezondheid tijdens het eerste jaar van de COVID-19-pandemie (eind mei tot begin juni 2020). De steekproef bestond uit 35 late adolescenten en jongvolwassenen (48,6% vrouw) tussen de 16 en 25 jaar oud (M = 19,6, SD = 2,86). De resultaten toonden aan dat de 35 deelnemers zich over het algemeen zeer goed aan 'social distancing' hielden en dat gevoelens van solidariteit met anderen en het gevoel verantwoordelijk te zijn voor anderen de belangrijkste redenen waren voor naleving. Bovendien bleek uit de resultaten dat participanten tijdens de COVID-19-pandemie mentale gezondheidsproblemen ondervonden (zoals angst of eenzaamheid), maar ook positieve uitkomsten ervaarden, zoals het hebben van meer tijd voor hobby's. Tot slot bleek het hebben van een natuurlijke mentor een positieve invloed te hebben op de naleving van 'social distancing', wat werd toegeschreven aan de sociale steun die zo'n mentor kan bieden alsmede de mogelijkheid om te praten over de maatregelen.

De derde studie (hoofdstuk 4) was een drie-level meta-analyse die de effecten van de COVID-19-pandemie en de bijbehorende maatregelen op de mentale gezondheid van late adolescenten en jongvolwassenen onderzocht. In dit onderzoek werd mentale gezondheid geoperationaliseerd in dertien "domeinen" die ieder een aspect van mentale gezondheid representeerde, waaronder domeinen van mentale klachten (bijv. angstklachten, depressieve symptomen, stressklachten, slaapproblemen, eenzaamheid en verschillende vormen van middelenmisbruik), maar ook een domein voor positieve aspecten van de mentale gezondheid (levensvoldoening, positieve affectie en zelfeffectiviteit). Deze dertien domeinen van mentale gezondheid werden ook samengevoegd tot twee overkoepelende/brede domeinen, waarvan de één internaliserende symptomen betrof en de ander externaliserende symptomen. In totaal konden 22 studies worden geïncludeerd waaruit 105 effectgroottes konden worden geëxtraheerd. Deze meta-analyse bevatte alleen

studies met ten minste één meting die plaatsvond vóór de COVID-19-pandemie en ten minste één meting die plaatsvond tijdens de COVID-19 pandemie, zodat de impact van de pandemie op de mentale gezondheid vastgesteld kon worden. Kenmerkend aan dit design is dat er sprake was van afhankelijkheid in de data, doordat nagenoeg alle participanten in de geïncludeerde studies als het ware hun eigen controlegroep vormden. Om deze afhankelijkheid in de data te modelleren werden effectgroottes berekend die (deels) gebaseerd waren op de samenhang tussen de twee metingen. Voor deze samenhang werd een correlatie gekozen die was afgeleid van eerder empirisch onderzoek (in de tekst aangeduid als 'verwachte' correlatie). Tevens werden dezelfde effectgroottes berekend op grond van een 'extreme' correlatie (van bijna 1) en effectgroottes op grond van geen correlatie (onafhankelijkheid van de data) voor het uitvoeren van sensitiviteitsanalyses. Uit de resultaten bleek dat de COVID-19-pandemie geen effect had op een van de dertien aspecten van mentale gezondheid van late adolescenten en jongvolwassenen, noch op de overkoepelende domeinen van internaliserende en externaliserende symptomen. Dezelfde resultaten bleken uit de sensitiviteitsanalyses met effectgroottes die gebaseerd waren op een extreme correlatie en geen correlatie.

De vierde en laatste studie van dit proefschrift (hoofdstuk 5) was een longitudinale studie die de effecten van de duur van de COVID-19-pandemie op de mentale gezondheid van late adolescenten en jongvolwassenen uit de algemene bevolking onderzocht. Deze studie toetste ook het modererende effect van de ernst van de pandemie (uitgedrukt in de risiconiveaus beschreven door de Nederlandse overheid) op de relatie tussen pandemieduur en mentale gezondheid. In tien meetmomenten werden data verzameld tijdens het eerste jaar van de pandemie. Tijdens elk meetmoment werden de overheidsmaatregelen voor het indammen van de virusverspreiding aangescherpt of versoepeld. De uiteindelijk te analyseren steekproef bestond uit N = 161 late adolescenten en jongvolwassenen uit Nederland ($M_{leeftijd}$ = 21,17, $SD_{leeftijd}$ = 2.38, 87% vrouw), en bestond uit deelnemers die de vragenlijst invulden bij het eerste meetmoment en ten minste één van de opvolgende meetmomenten. Uit de resultaten bleek dat wanneer gecontroleerd werd voor veerkracht en geslacht, de duur van de pandemie niet samenhing met mentale gezondheid en dat de ernst van de pandemie deze samenhang niet modereerde. Bovendien bleek dat vrouwen meer mentale gezondheidsproblemen rapporteerden en dat een hogere veerkracht samenhing met minder mentale gezondheidsproblemen.

Samenvattend bleek uit de resultaten van Hoofdstuk 2 en 3 dat late adolescenten en jongvolwassenen zich vrij goed aan de preventieve maatregelen hielden, wat mogelijk heeft bijgedragen aan het verminderen van de verspreiding van het COVID-19-virus. De studies identificeerden ook verschillende factoren die van invloed waren op naleving van de maatregelen, namelijk mentale gezondheidsproblemen, veerkracht,

copingstrategieën en de beschikbaarheid van een natuurlijke mentor. Bovendien gaven de studies inzicht in de redenen voor naleving van de maatregelen van late adolescenten en jongvolwassenen, zoals het voelen van verantwoordelijkheid voor anderen. De studies in Hoofdstuk 4 en 5 toonden vooral aan dat de mentale gezondheid van late adolescenten en jongvolwassenen niet werd beïnvloed door de COVID-19-pandemie en de maatregelen die de overheid oplegde. Internationale studies zijn niet eensgezind over de effecten die de COVID-19-pandemie mogelijk had op de mentale gezondheid van late adolescenten en jongvolwassenen. Sommige studies concludeerden dat de COVID-19-pandemie de mentale gezondheidsproblemen verergerde (die in sommige gevallen terugkeerden naar een niveau van vóór de pandemie naarmate de tijd verstreek), terwijl andere studies concludeerden dat COVID-19 gemengde effecten had op de mentale gezondheid (e.g., een toename van depressieve klachten en een afname van angstklachten) of juist helemaal geen effect had.

Dit proefschrift heeft op unieke wijze bijgedragen aan de lopende discussie over de mentale gezondheid van late adolescenten en jongvolwassenen tijdens de COVID-19-pandemie en de wijze waarop veerkracht, de beschikbaarheid van een natuurlijke mentor en naleving van de maatregelen hiermee samenhing. Veerkracht leek een belangrijke beschermende factor te zijn tegen de ontwikkeling van mentale gezondheidsproblemen in het eerste jaar van de pandemie. Ook lijkt er een relatie te bestaan tussen naleving van de maatregelen en mentale gezondheid, maar het is nog onduidelijk hoe deze factoren elkaar kunnen beïnvloeden. Tot slot bleek uit de longitudinale studie dat gedurende de pandemie vrouwen meer mentale gezondheidsproblemen rapporteerden dan mannen.

Concluderend biedt dit proefschrift waardevolle inzichten in de naleving van de maatregelen en de mentale gezondheid van late adolescenten en jongvolwassenen tijdens de COVID-19-pandemie. Het algemene beeld dat uit dit proefschrift blijkt is dat zij zich vrij goed aan de (social distancing) maatregelen hielden en dat het daarmee aannemelijk is dat zij hebben bijgedragen aan het verminderen van de verspreiding van het COVID-19-virus. Bovendien bleek dat verschillende factoren mogelijk invloed hadden op naleving van de maatregelen, waaronder mentale gezondheid en de aanwezigheid van een natuurlijk mentor. Dit proefschrift vond geen bewijs dat de COVID-19-pandemie de mentale gezondheid van late adolescenten en jongvolwassenen beïnvloedde in het eerste jaar van de pandemie. Hiermee biedt dit proefschrift een kritische blik op de heersende opvatting dat de COVID-19-pandemie een algemeen negatief effect zou hebben gehad op de mentale gezondheid van late adolescenten en jongvolwassenen. Daarnaast biedt dit proefschrift inzicht in de verschillende factoren die mogelijk als buffer of risicofactor hebben gefungeerd voor het ontwikkelen van mentale gezondheidsproblemen tijdens de pandemie.

In de algemene discussie van dit proefschrift (Hoofdstuk 6) wordt bediscussieerd dat iedereen voortdurend moest improviseren tijdens de COVID-19-pandemie en dat mensen zich steeds moesten aanpassen aan de voortdurend veranderende omstandigheden als gevolg van de verspreiding van COVID-19 en de maatregelen die werden opgelegd om de verspreiding van het virus te verminderen. Het is de vraag of late adolescenten en jongvolwassenen uit de algemene populatie de pandemie hebben overwonnen. Dit proefschrift kan geen eenduidig antwoord geven op deze vraag, maar biedt wel een waardevolle empirische invalshoek. Het lijkt erop dat de mentale gezondheid van late adolescenten en jongvolwassen in de algemene populatie niet (ernstig) werd beïnvloed tijdens het eerste jaar van de pandemie, maar langetermijneffecten kunnen niet worden uitgesloten. Bovendien kunnen de effecten van de pandemie anders zijn (geweest) voor subgroepen van jongeren (e.g., jongeren die al mentale gezondheidsproblemen hadden voorafgaand aan de pandemie). Het is daarom waarschijnlijk dat specifieke groepen meer impact van de pandemie hebben ervaren en de bijbehorende moeilijkheden (nog) niet hebben overwonnen.

Uit dit proefschrift bleek dat veerkracht een belangrijke beschermende factor lijkt te zijn tegen de ontwikkeling van mentale gezondheidsproblemen. Daarom sluit dit proefschrift aan bij internationale literatuur die onderschrijft dat beleid zich zou moeten richten op het vergroten van veerkracht bij jongeren. Hierdoor zullen jongeren beter in staat zijn zich aan te passen aan stressvolle gebeurtenissen (e.g., de COVID-19 pandemie) om deze vervolgens te overwinnen, waarmee de ontwikkeling van mentale gezondheidsproblemen naar verwachting grotendeels voorkomen kan worden.

About the Author

Naomi Koning was born on the 20th of September in 1996 in Hoorn, the Netherlands. In 2014 she graduated from high school (Oscar Romero, Hoorn), and in the next year she started her bachelor study in Pedagogical Sciences at the Vrije Universiteit (VU) in Amsterdam. During her bachelor, she also followed an additional minor in Youth and Criminality at the Utrecht University (UU). Following her bachelor's degree in 2018, she entered the master Forensic Child and Youth Care Sciences at the University of Amsterdam (UvA). During her masters, she did an internship as a psychologist who tests and reports on suspects of whom the judge required psychological testing (Pro Justitia reports). During this internship, she also obtained her basic certificate psychodiagnostics. During her education, she also obtained research experience in two different research projects as a student-assistant.

Even before receiving her master's degree, she already started on the research project that would develop into a complete PhD program. As an external PhD student, she focused her research on the mental health and compliance of youth during the COVID-19 pandemic. She also published on the topics of youth mental health, health behavior, resilience, and natural mentoring. Due to lack of funding for the PhD project, she also worked briefly as a residential supervisor for convicted high-risk youth at Forensisch Centrum voor Adolescenten, and as a researcher on multiple projects during her PhD, namely a research project on the effectiveness of FITT (Family-based Intensive Trauma Treatment), and on a research project focussing on increasing mental health awareness and gratitude in youth (We Spark The World). Additionally, she worked externally for the Ministry of Justice and Security on developing two youth interventions (IPTA and RIO) to prepare them to apply for certification as well-substantiated interventions in preventing delinquency and on re-acquiring certification of AJB as an effective youth intervention in preventing youth delinquency. After her PhD dissertation was submitted and approved, she started working as a postdoctoral researcher at Garage2020 in which she focuses her research in examining the effectiveness of the preventive youth intervention AJB (Alleen Jij Bepaalt wie je bent), in developing a manual for AJB-junior, and in program evaluations for both AJB and AJB-junior.

Publications in this dissertation

Koning, N., Hagedoorn, N., Stams, G.J.J.M., Assink, M., & van Dam, L. (2022). What makes Dutch Youth comply with Preventive COVID-19 Measures? An Explorative Study. *Journal of Community Psychology, 50*(2), 653-665. https://doi.org/10.1002/jcop.22651

Koning, N., Gorter, A., Zonneveld, M., van Rooij, F., Spruijt, P., & van Dam, L. (2023). Why most youth comply with the social distancing measures: a qualitative study. Journal of Public Health, (2023), 1-16. https://doi.org/10.1007/s10389-023-02006-z

Other publications

Koning, N., & van Dam, L. (2023). Help jongeren vaker hun dankbaarheid te uiten: Eenvoudige interventie kan mentaal welzijn vergroten. *Kind & Adolescent Praktijk, 22*(2), 32-37. https://doi.org/10.1007/s12454-023-1245-7

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Submitted articles

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Koning, N., Assink, M., Stams, G. J. J. M., Popma, A., & Van Dam, L. (2024). *Has the COVID-19 Pandemic Affected the Mental Health of Late Adolescents and Young Adults? A Meta-analysis of the Evidence.* [Manuscript submitted for publication]. Research Institute of Child Development and Education, University of Amsterdam

Meulen, P., Koning, N., Assink, M., Van Hooren, S., Kolthoff, E., & Heynen, E. (2024). *Letting Work What Works - Effectively Preventing Juvenile Delinquency in the Netherlands: A Meta-Analysis of the Evidence.* [Manuscript submitted for publication]. Faculty of Law, Open University of the Netherlands

CV

Author Contributions

Chapter 2

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Contributions: NK, GJS, and LvD designed the study. NK conducted the data collection and LvD supervised the data collection. NK, NH, MA, and GJS conducted the analyses. NK and NH wrote the manuscript. GJS, MA and LvD supervised the study, reviewed the paper and provided critical revisions.

Chapter 3

Published as: Koning, N., Gorter, A., Zonneveld, M., van Rooij, F., Spruijt, P., & van Dam, L. (2023). Why most youth comply with the social distancing measures: a qualitative study. *Journal of Public Health*, 1-16. https://doi.org/10.1007/s10389-023-02006-z

Contributions: NK, PS, and LvD designed the study. AG, MZ, & PS collected the data. NK and LvD supervised the data collection. NK, AG, MZ, and FvR conducted the analyses. NK, AG and MZ wrote the paper. PS and LvD supervised the study. FvR, PS, and LvD reviewed the paper and provided critical revisions.

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Contributions: NK, MA, GJS, and LvD designed the study. NK, MA, & GJS conducted the search. NK and MA developed the coding manual. NK reviewed the included studies and coded the studies. NK and MA performed the statistical analyses and wrote the paper. GJS and LvD supervised the study. GJS, AP, and LvD reviewed the paper and provided critical revisions.

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