

Coping with the COVID-19 pandemic by Paralympic athletes preparing for elite sport events: A longitudinal study

Piotr Kazimierz Urbański¹  | Radosław Rogoza² | Britton Brewer³ | Tomasz Tasiemski¹

¹Department of Adapted Physical Activity, Poznań University of Physical Education, Poznań, Poland

²Institute of Psychology, Cardinal Stefan Wyszyński University in Warsaw, Warszawa, Poland

³Department of Psychology, Springfield College, Springfield, USA

Correspondence

Piotr Kazimierz Urbański, Department of Adapted Physical Activity, Poznań University of Physical Education, Poznań, Poland.
Email: urbanski@awf.poznan.pl

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Introduction: This study investigates the impact of the COVID-19 pandemic on mental health, coping styles and their relationship, and training opportunities in elite athletes with disabilities (AwD) preparing for national and international sport events during a ten-month observation period.

Methods: The study covered four time points in 3-month intervals, one retrospective, and three times during the 10 months of the pandemic period with diversified numbers of average new infections per day: A—pre-pandemic, B—third wave of the pandemic (mean = 15681), C—decrease of the pandemic (mean = 102), and D—fourth wave of the pandemic (mean = 22591). Main outcome measures included the Coping Inventory for Stressful Situations and the Hospital Anxiety and Depression Scale.

Results: The models regarding changes in anxiety ($F_{(3,72)} = 22.43; p < 0.001$; partial $\eta^2 = 0.48$) and depression ($F_{(3,72)} = 23.82; p < 0.001$; partial $\eta^2 = 0.50$) over the four time points of examination were significant. The pattern of relationship between coping styles and mood changes during COVID-19 pandemic periods, that is, a sudden increase in anxiety during dynamic growth of infections (waves of a pandemic) and a steady increase in depression over the course of the pandemic was not found. The difference in planned and actual training decreased significantly over time ($p < 0.001$).

Conclusions: During the transitional times of the COVID-19 pandemic, both mental health and training opportunities of AwD were at increased risk. Individual coping styles used by AwD were insufficient resources to cope with the extreme stress caused by the COVID-19 pandemic. Their mental health should be monitored in pandemics and similar situations to ensure appropriate and timely organizational and psychological intervention.

KEYWORDS

anxiety, athletes with disabilities, coping, COVID-19, depression, mental health, training performance

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1 | INTRODUCTION

From the end of the 2019 and onward, the COVID-19 pandemic has affected all spheres of human activity, including the economy, the healthcare system, tourism, education, and, in particular, sport.¹ To deal with the COVID-19 pandemic, most countries introduced an array of countermeasures against the spread of infection, including lockdowns that limited social, professional, and physical activity. From the beginning of 2020 until 2022, the extent of these lockdown measures varied from country to country causing many restrictions in moving, traveling, exercising, and accessing public spaces, sport facilities, and medical or social services.^{1,2}

Previous studies have shown that COVID-19 pandemic and psychophysical conditions of life under lockdown or quarantine may decrease physical and mental health of the global population, noninfectious chronic disease patients, COVID-19 patients, and quarantined persons.³ Consequences of the COVID-19 pandemic affected people in all population groups, including able-bodied people and persons with disabilities. Introduction of countermeasures against the spread of the COVID-19 and pandemic-related fear resulted in disturbance of many areas of life, including cancelation, or postponement of almost all sport activities and events around the world over the past 2–3 years.

Both able-bodied athletes and athletes with disabilities (AwD) experienced mental health problems, in particular decreased levels of physical activity, and increased levels of anxiety, depression, and sleep disorders during COVID-19 pandemic.^{4–10} The applied quarantine regulations and subsequent isolation affected the ability of many elite AwD to train, reduced contact with their coaches or sport assistants, and caused difficulties in conducting appropriate forms of training.^{6,11} Periods of inactivity, isolation from athletic teams, distance from the athletic community, low quality interactions with coaches, and lack of social support (e.g., fans, sports organizations, and media) have also been associated with emotional distress and psychological disorders in athletes.^{9,10} To our knowledge, however, no longitudinal studies in connection with the COVID-19 period and mental health related issues have been conducted in AwD. Additionally, previous findings suggest that AwD may experience difficulties in coping with this new, stressful situation even more than able-bodied athletes.¹²

Coping is defined as cognitive and behavioral efforts to master, reduce, or tolerate the internal and/or external demands that are created by the stressful transaction.¹³ Stress is a part of athletes' lives and may affect their ways of coping with the demands of sport. Their daily responsibilities involve numerous challenges that can contribute

to stress.^{14,15} Previous research has found that the levels of anxiety and depression during different pandemic periods may be partially explained by coping styles.¹³ Therefore, to extend these findings, this study investigated the impact of the COVID-19 pandemic on mental health, coping styles, and their relationship in elite AwD during a ten-month period. Additionally, we evaluated the influence of the COVID-19 pandemic on training opportunities in AwD preparing for national and international elite sport events.

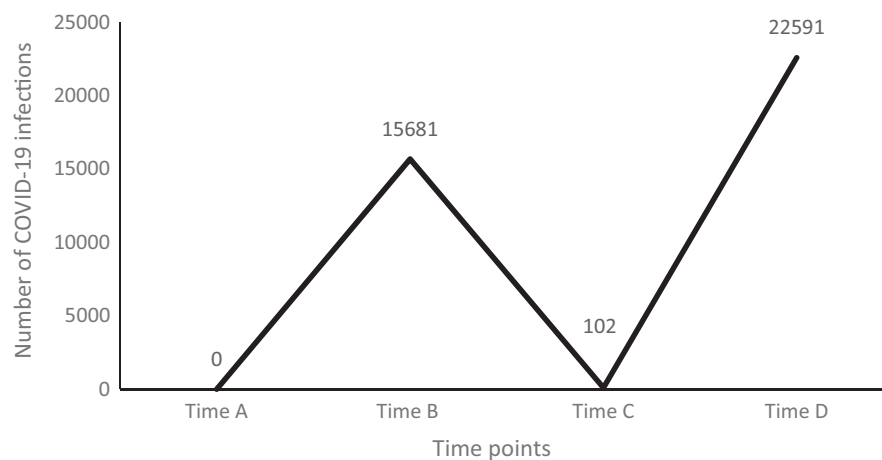
The study tested three hypotheses based on previous findings. First, given that the COVID-19 pandemic has changed over time, with clear waves indicated by dynamic increases in new infections and corresponding restrictions in daily life, we anticipated that levels of anxiety and depression in AwD would increase during pandemic waves and decrease during stable pandemic periods. That is, we expected a cubic relationship. Second, based on previous research^{16,17} on coping versus anxiety and depression, we hypothesized that levels of anxiety and depression of AwD would be negatively correlated with task-oriented coping (includes individuals' efforts and thoughts aimed at solving a problem or attempting to change the situation) and positively correlated with avoidance-oriented (involves trying to avoid stressors rather than dealing with them) and emotion-oriented styles (reducing stress through emotional responses, including emotion expression, blaming others, self-blame, emotion containment, and passive resignation) during pandemic waves.¹⁸ Third, based on findings from a previous study of the impact of the COVID-19 pandemic on AwD preparing for the Paralympic Games in Tokyo,⁶ we predicted that AwD would reduce their weekly training time during the pandemic period relative to their originally planned training schedule for this period (planned vs. actual training).

2 | METHODS

2.1 | Participants

Altogether, 75 AwD participated in the study. The majority were male (70.1%), and their mean age was 33 years (SD = 11.90). The most represented sport disciplines were as follows: swimming (18.6%), athletics (14.4%), sitting volleyball (11.3%), and fencing (13.4%), and average training experience was 10.30 (SD = 8.30) years. The main types of disability reported by athletes were amputation (34.7%), "Les Autres" (30.1%), spinal cord injury (26.7%), and cerebral palsy (8.0%), and the mean time since injury or diagnosis of disease was 18.8 (SD = 13.90) years. Initially, 116 Paralympic athletes were contacted to participate in the longitudinal monitoring, but 22 participants dropped

FIGURE 1 Research design: Time A—retrospective, Time B, C, D—during COVID-19 pandemic. Measures used in all time points: CISS, HADS. Measures used in B, C, D time: Training time.



out during the course of the study period (did not participate in all study examinations), leaving 94 athletes who participated in all four assessment episodes. In order to maintain homogeneity of the study sample, we excluded 19 athletes with visual impairment, leaving 75 athletes with physical disabilities included in this study. Attrition analyses revealed that participants who dropped out of the study did not differ from the remaining participants in terms of anxiety ($t = -0.85$; $p = 0.399$; $d = -0.21$), depression ($t = 0.09$; $p = 0.926$; $d = -0.10$), and TO ($t = -1.52$; $p = 0.132$; $d = -0.37$), EO ($t = -1.05$; $p = 0.297$; $d = -0.25$), and AO ($t = -1.48$; $p = 0.142$; $d = -0.36$) coping.

2.2 | Measures

To assess coping with the COVID-19 pandemic the *Coping Inventory for Stressful Situations* (CISS) was used.¹⁹ The 48-item CISS requests respondents to indicate how often they engaged in various coping styles in response to a particular stressful situation. Participants choose from one of five Likert-type responses, ranging from “not at all” to “very much.” The CISS measures three forms of coping: task-oriented (TO), emotion-oriented (EO), and avoidance-oriented (AO). Higher scores on each subscale indicate a greater degree of coping activity. The Cronbach α coefficient for the CISS in the present study was satisfactory for particular study terms (TO: A $\alpha = 0.90$; B $\alpha = 0.92$; C $\alpha = 0.90$, D $\alpha = 0.93$; EO: A $\alpha = 0.90$; B $\alpha = 0.92$; C $\alpha = 0.93$, D $\alpha = 0.90$; AO: A $\alpha = 0.81$; B $\alpha = 0.88$; C $\alpha = 0.87$, D $\alpha = 0.84$).

To assess effectiveness of coping (i.e., levels of anxiety and depression), the *Hospital Anxiety and Depression Scale* (HADS) was used.²⁰ The scale consists of 14 items related to anxiety (HADS-A) and depression (HADS-D), 7 items each. Items are scored from “very rarely” to “often.” Cronbach α coefficients for the HADS-A and the HADS-D in the present study were satisfactory for particular

assessment episodes (HADS-A: A $\alpha = 0.73$; B $\alpha = 0.81$; C $\alpha = 0.87$, D $\alpha = 0.66$; HADS-D: A $\alpha = 0.71$; B $\alpha = 0.72$; C $\alpha = 0.80$, D $\alpha = 0.62$).

To measure changes in training schedule due to the pandemic, we asked participants during each evaluation to state their actual training time during the last month and provide their originally planned training time for the same month. The same approach was used in 2021 during a study of 166 Paralympic athletes.⁶

2.3 | Procedure

All Paralympic athletes with physical disabilities included in the Polish Paralympic preparation program were invited to participate in this study. The study covered four time points in 3-month intervals (Figure 1), one retrospective, and three times during the 10 months of pandemic period with diversified numbers of average new infections per day: A—pre-pandemic, that is, February 2020, B—third wave of the pandemic, that is, April 2021 (mean = 15 681), C—decrease of the pandemic, that is, July 2021 (mean = 102), and D—fourth wave of the pandemic, that is, November 2021 (mean = 22 591). During the last week of April 2021, athletes were emailed a link to an online survey hosted by Google Forms, with completion reminders sent weekly during the subsequent 2 weeks. This study was approved by the Ethical Committee of Poznan University of Medical Sciences (KB-742/21). All participants gave informed consent to participate in the study.

2.4 | Statistical analysis

To test the first hypothesis, we conducted a repeated-measures analysis of variance (RM-ANOVA). We analyzed two separate models for depression and anxiety across the four time points. Within these models, we analyzed how

well linear, quadratic, and cubic trends fit the data. To test for differences across time points, Bonferroni post hoc tests were applied. To test the second hypothesis, we tested six cross-lagged models in which specific combinations of coping and depression or anxiety at time A predicted the same combinations of coping and depression or anxiety at time B, which were predictors at time C, which, finally, were predictors of time D variables. To evaluate fit of the tested models, we relied primarily on the Comparative Fit Index (CFI) and the Standardized Root Mean Residual (SRMR) given that the typically used Root Mean Square Error of Approximation tends to be biased in models with low numbers of degrees of freedom. We deemed models as well-fitted when the values of CFI were >0.90 and the values of SRMR were <0.08 .²² To test our last hypothesis regarding the differences between the planned and actual training times, we conducted three *t*-tests for dependent samples. All statistical analyses were performed with the IBM Statistical Package for Social Sciences software (IBM SPSS Statistics version 28). The level of significance was set at $\alpha \leq 0.05$.

3 | RESULTS

3.1 | Hypothesis 1

The model regarding changes in anxiety over time was significant ($F_{(3,72)} = 22.43$; $p < 0.001$; partial $\eta^2 = 0.48$). The estimated marginal means of anxiety across the four time points are presented in Figure 2. The within-subjects contrasts revealed that linear ($F_{(1)} = 17.02$; $p < 0.001$; partial $\eta^2 = 0.19$) and cubic ($F_{(1)} = 27.96$; $p < 0.001$; partial $\eta^2 = 0.27$), but not quadratic ($F_{(1)} = 3.57$; $p = 0.063$; partial $\eta^2 = 0.05$) effects were significant. Post hoc comparisons revealed that the pre-pandemic level of anxiety was significantly lower from the time points during pandemic waves (time B = -1.77 [95%CI = $-2.53, -1.02$]; SE = 0.28;

$p < 0.001$) and (time D = -1.60 [95%CI = $-2.31, -0.89$]; SE = 0.26; $p < 0.001$), but was not different from the stable pandemic period (time C = -0.64 [95%CI = $-1.33, 0.05$]; SE = 0.26; $p = 0.086$). The anxiety level during stable pandemic period was also lower than the anxiety level during pandemic waves (time B = -1.13 [95%CI = $-1.99, -0.28$]; SE = 0.32; $p = 0.004$) and (time D = -0.96 [95%CI = $-1.76, -0.17$]; SE = 0.29; $p = 0.010$). There were no differences in the level of anxiety during the two pandemic waves (0.17 [95%CI = $-0.78, 1.13$]; SE = 0.35; $p = 1.000$). Thus, the results for anxiety fully support the Hypothesis 1.

We followed the same procedure to analyze changes in depression. The model was also significant ($F_{(3,72)} = 23.82$; $p < 0.001$; partial $\eta^2 = 0.50$). The estimated marginal means of depression across four time points are presented on Figure 3. The within-subjects contrasts revealed that only the linear trend ($F_{(1)} = 55.77$; $p < 0.001$; partial $\eta^2 = 0.43$) fit the analyzed curve well (quadratic: $F_{(1)} = 0.02$; $p = 0.900$; partial $\eta^2 = 0.00$; cubic: $F_{(1)} = 2.98$; $p = 0.089$; partial $\eta^2 = 0.04$). Post hoc comparisons revealed that the pre-pandemic level of depression was significantly different not only from times during pandemic waves (time B = -0.93 [95%CI = $-1.45, -0.42$]; SE = 0.19; $p < 0.001$) and (time D = -2.03 [95%CI = $-2.73, -1.32$]; SE = 0.26; $p < 0.001$), but also from the stable pandemic period (time C = -1.15 [95%CI = $-1.90, -0.39$]; SE = 0.28; $p < 0.001$). The depression level during the first pandemic wave was lower than the depression level during the second wave (-1.09 [95%CI = $-1.88, -0.31$]; SE = 0.29; $p = 0.002$). All of the remaining comparisons were non-significant. Thus, the results for depression partially supported Hypothesis 1.

3.2 | Hypothesis 2

We tested six cross-lagged models, three for anxiety and three for depression. In each model, we used different coping style to reduce the influence of the shared variance. Fit

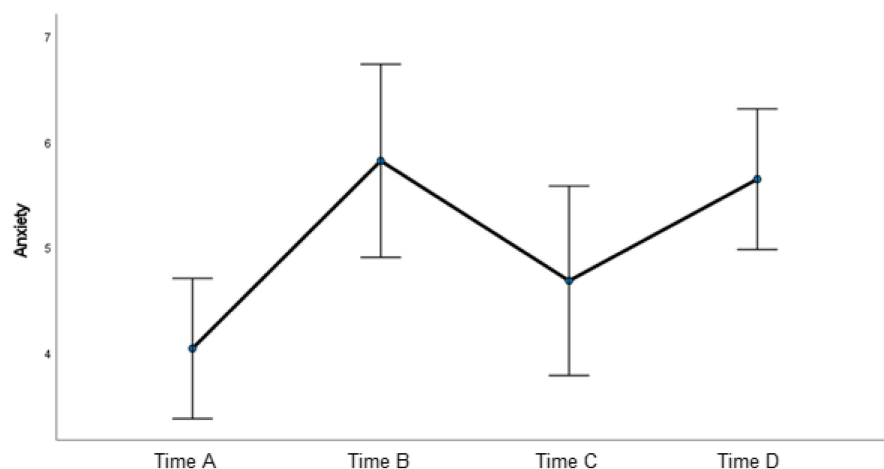


FIGURE 2 Estimated Marginal Means of Anxiety Across Four Time Points.

FIGURE 3 Estimated Marginal Means of Depression Across Four Time Points.

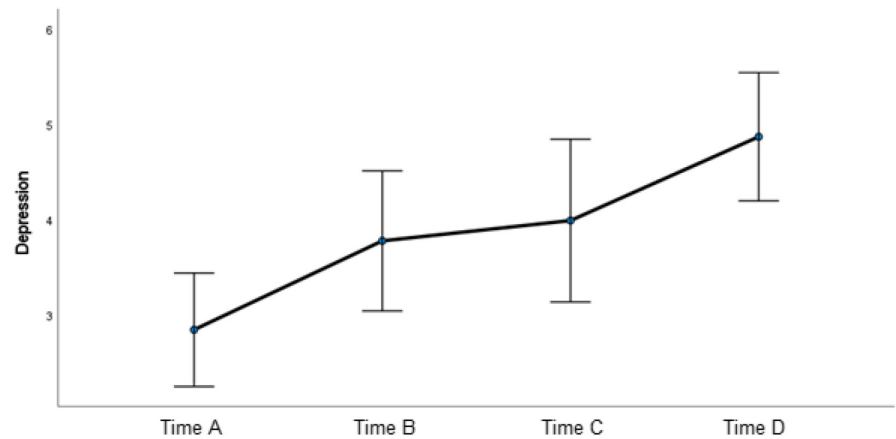


TABLE 1 Fit Indices of the Analyzed Cross-Lagged Models.

Model	$\chi^2_{(12)}$	CFI	SRMR
Anxiety			
Task Oriented Coping	46.27	0.925	0.062
Emotional Oriented Coping	43.62	0.936	0.055
Avoidance Oriented Coping	46.13	0.935	0.055
Depression			
Task Oriented Coping	36.06	0.948	0.056
Emotional Oriented Coping	34.20	0.955	0.055
Avoidance Oriented Coping	33.75	0.959	0.051

Note: All chi-square estimates were significant at $p < 0.001$.

indices of the analyzed models are given in Table 1. All of the analyzed models were adequately fitted to the data. The results presenting autoregressive and cross-lagged effects are presented in Figures 4, 5. All of the autoregressive effects were significant in all models. Only two cross-lagged effects were significant. EO coping at time C predicted anxiety at time D and depression at time C predicted AO at time D. We also found three significant correlations between coping and anxiety (and none with depression). EO was positively related to anxiety in the pre-pandemic period, but was negatively related to it during the stable pandemic period (time C). During the second pandemic wave, AO coping was negatively related to anxiety. Given that we did not find any significant correlations between TO and anxiety and depression, Hypothesis 2 was rejected in full.

3.3 | Hypothesis 3

To test our last hypothesis, we compared the original planned training schedule with the actual training time.

As shown in Table 2, hypothesis 3 was fully confirmed for time B and time C, but not for time D. Thus, hypothesis 3 received partial support. The difference in planned and actual training significantly decreased over time.

4 | DISCUSSION

The main purpose of this study was to assess the impact of the COVID-19 pandemic on and relationships among mental health and coping styles in elite AwD. The individual coping styles used by AwD showed no significant association with changes in mood (i.e., increase of anxiety during dynamic growth of infections and steady increase of depression) during such an extreme and unpredictable phenomenon as the COVID-19 pandemic. It is likely that measures taken at the government level to reduce fears of infection, such as a general vaccination program or the use of effective treatments when contracting SARS-CoV-2 virus, are more important for mental health than individual stress coping mechanisms.²³ The results of this study partially confirmed our first hypothesis. The level of anxiety differed depending on the wave of the pandemic, increasing in the periods of greater intensity of infections and restrictions, and decreasing in the stable periods. The measure of pandemic intensity was based on the average of new cases of COVID-19 infections (Figure 1) which was the most common metric for assessing the status of the pandemic.²⁴ At the same time, the level of depression showed a linear increase regardless of the period of the pandemic, presenting the highest level in the last assessment (time D). These results are consistent with those obtained in other investigation, which has shown that both non-athletes and athletes declined in mental health during the COVID-19 outbreak, and experienced increased risk of depression.^{6,8} In the case of high-level professional AwD, potential reasons for those negative changes include disturbances in everyday training routines, uncertainty regarding the organization of sport events, fear about being

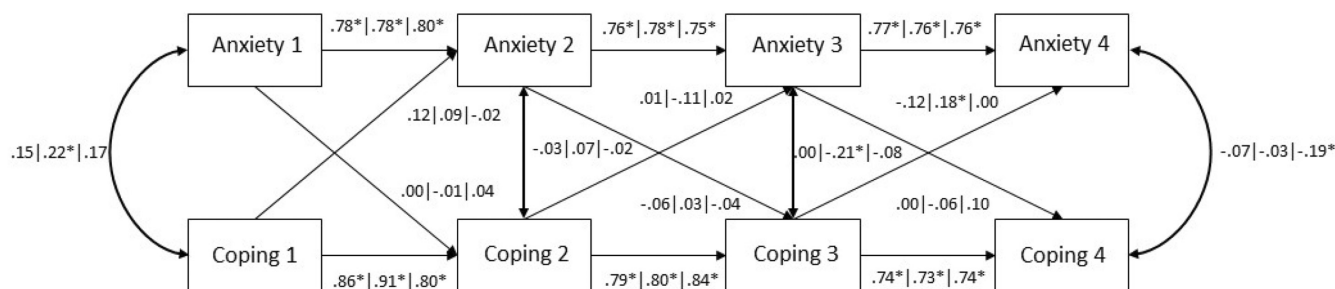


FIGURE 4 Cross-Lagged Model of Anxiety and Coping Styles Across Four Time Points. The results are presented in the following order: TO | EO | AO.

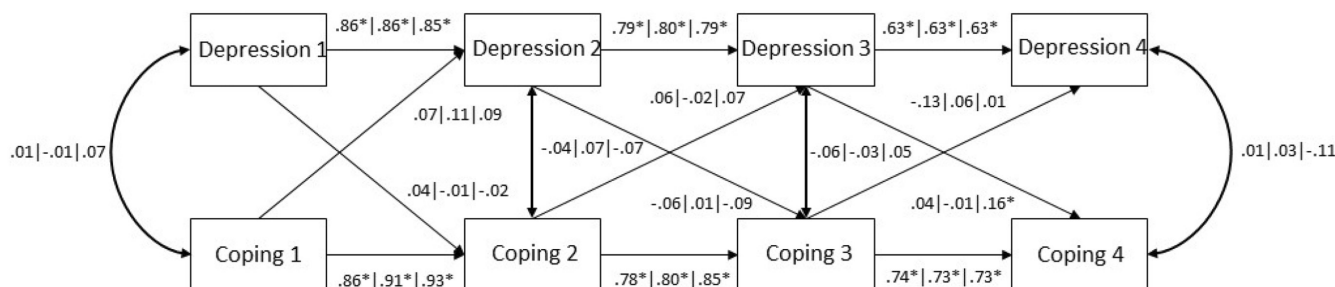


FIGURE 5 Cross-Lagged Model of Depression and Coping Styles Across Four Time Points. The results are presented in the following order: TO | EO | AO.

TABLE 2 Comparison of Planned and Actual Training (in Hours).

	Planned <i>M</i> (SD)	Actual <i>M</i> (SD)	Paired correlation (95% CI)	Mean Difference (SD)	<i>t</i> ₍₇₄₎	<i>d</i> (95% CI)
Time B	11.08 (6.35)	8.81 (5.71)	0.82*** (0.69, 0.90)	2.27 (3.67)	5.35***	0.62 (0.37, 0.86)
Time C	13.25 (8.40)	11.65 (6.91)	0.86*** (0.79, 0.93)	1.60 (4.33)	3.20**	0.37 (0.14, 0.60)
Time D	13.49 (13.52)	12.27 (14.00)	0.88*** (0.58, 0.98)	1.22 (6.86)	1.54	0.18 (−0.05, 0.40)

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

infected with SARS-CoV-2 before sport competitions, and reduced training opportunities.^{25,26} Levels of anxiety varied in a cubic way, while levels of depression increased linearly. This is probably due to the fact that anxiety is sensitive to many stressors, whereas depression could have been cumulative.²⁷ Anxiety can be considered as a situation or event-related transient state or a relatively stable personality characteristic, with the former more likely to increase in life-threatening and harsh conditions²⁸; it is one variety of stress response.²⁹ In sport, anxiety is often regarded as a typical response to a situation where athletes' skills are being evaluated.³⁰ Therefore, fluctuation of anxiety is predictable in relation to COVID-19 waves, and depression symptoms are more likely to rise. Anxiety and depression are often highly correlated with each other.³¹ The current findings are consistent with research indicating that anxiety often precedes depression in response to stressors, and may signal the eventual onset of depression.²⁷ It appears that anxiety levels changed dynamically

depending on the stage of the pandemic, while depression symptoms increased steadily due to accumulated fatigue during the pandemic. This interpretation, however, needs further empirical examination.

The expected relationships between coping effectiveness in AWD (i.e., levels of anxiety and depression) and coping style generally were not manifested. This is in contrast with previous research during COVID-19 pandemic based on population samples showing positive associations between maladaptive coping strategies and more severe anxious arousal symptoms or depression.^{16,17} The only significant relationships in our study involved EO coping at time C, which predicted anxiety at time D, and depression at time C, which predicted AO coping at time D. Interpretation of this relationship seems intuitive. Although EO coping can be effective for certain outcomes³² and under certain circumstances, such as when changing the situation is not feasible,³³ it is generally associated negatively with indices of psychological health.³⁴

Thus, it is reasonable to expect increased EO coping to result in increased anxiety. Conversely, the increased depression level at time C was positively associated with the use of AO styles, characteristic of people with depression symptoms. The use of maladaptive coping style and increased level of depression 3 months before the Paralympic Games could have had a negative effect on athletes' performance during this major sport event. Our hypothesis was only minimally supported, perhaps because coping styles were more strongly associated with stable personality traits than with the fluctuating demands of the pandemic. Previous research has shown that coping patterns at baseline had no main effects on later levels of distress, but distress at baseline predicted subsequent use of engagement and disengagement coping patterns.³⁵ This speculation also needs further examination in the context of the COVID-19 pandemic.

Our study revealed that the time planned for training was significantly reduced due to the pandemic, which could affect AwD's preparation for competition. This change was significant and ranged from 9 to 20%. Interestingly, the difference between planned and actual training decreased gradually over time and was the smallest during the last wave of the pandemic, suggesting that AwD were adapting to the pandemic situation or were given increased access to training facilities. This trend was highly desirable considering the fact that measurement time C was undertaken just 3 months before the Paralympic Games in Tokyo. A comparable investigation was undertaken with German Paralympic athletes during the first year of the COVID-19 pandemic and involved 8 measurement time points. The results revealed that after initial lockdown an increase of training minutes per week was seen from the first assessment time point to the fourth assessment time point, and these changes were related to gradually reduced pandemic restrictions. Then, a decrease of training time was observed until the seventh time point, reflected in prolonged restriction and partial lockdown. The highest training minutes per week were noted at the eighth measurement time point despite severe COVID-19 restrictions.⁸ In future studies, it will be important to assess whether the change in training time during pandemic is related more to general changes in training restrictions (e.g., closing sport facilities) or to behavior/adaptation of AwD (e.g., changing the location of training to home or outside). Based on previous research^{6,8} and conservation of resources theory³⁶ we expect that return of pandemic waves will again negatively affect AwD. Our study sample consisted of AwD with a wide variety of disabilities with different relations to psychological conditions such as depression and anxiety. For example, the levels of anxiety and depression in young people with SCI are comparable to the normative range, whereas persons with cerebral

palsy have an increased risk of depression or anxiety comparing to a population sample.^{37,38} Pandemic-related distress may manifest in uncertainty regarding their future sport career, training opportunities, and relations with sportsmates. Pre-pandemic studies showed that elite athletes experience mental health difficulties at a level equivalent to or exceeding the non-athlete population.³⁹ Therefore, it is important to further monitor the psychological condition of AwD. In order to counteract the COVID-19 pandemic and protect athletes from infection, Muti et. Al. (2022) developed and implemented a protocol aimed to prevent outbreaks and infections for COVID-19 and other potential future pandemics involving pathogens with a similar path of transmission.⁴⁰ Hayton (2022) presented a blend of online/digital and physical innovations adopted by third-sector sport organizations that may help inform future innovation in other disability sport and physical recreation-focused organizations in times of external uncertainty.⁴¹

The main strengths of the study are that it involved elite AwD and used a longitudinal research design. There are also some limitations of the present study that should be considered when interpreting the results. First, the initial assessment (time A) was retrospective and was subject to the potential effects of recall bias. The time A assessment did, however, provide a baseline against which subsequent assessments could be compared. Second, the study relied exclusively on self-reported outcomes, which are not as precise as in-depth interviews for evaluating mental health. Third, dietary intake and ability to undertake leisure-time physical activity during pandemic might be confounding variables affecting the mental health of the study participants. Fourth, the sample size was relatively small; additionally, 22 participants dropped out during the course of the study. A larger sample size would have allowed us to divide participants into smaller groups and analyze differences in the dependent variables in greater depth.

5 | PERSPECTIVES

During the transitional times of the COVID-19 pandemic, both mental health and training opportunities of AwD are at increased risk. In our study, we did not confirm the relationship between coping styles and anxiety and depression during pandemic period (i.e., increased use of maladaptive coping strategies and decreased mood) suggested in previous reports.^{16,21} Individual coping styles (TO, EO, AO) used by AwD appeared to be insufficient resources to cope with the extreme stress caused by the COVID-19 pandemic. Apart from governmental strategies (e.g., vaccinations, treatment,

and restrictions), and sport organization activities (e.g., sport psychologist intervention), pandemic-specific coping strategies may play important role to deal with this extreme phenomenon. Because AwD reported significant negative changes in mood during the pandemic, their mental health should be monitored in pandemics and similar situations to ensure appropriate and timely organizational and psychological intervention. Additionally, a necessary challenge is the development of individual training plans that can be implemented at home, in a way that corresponds with the intensity and volume of the training carried out in non-pandemic settings. During pandemics, sport coaches should make an additional effort to ensure that training is disturbed as little as possible by restrictions, thus minimizing the difference between planned and actual training. Future studies that identify coping styles in relation with depression and anxiety symptoms experienced in response to stressful situations (e.g., COVID-19) are critical for promoting resilience in the face of future global health crises.

AUTHOR CONTRIBUTIONS

P.U., T.T., and B.B. involved in conceptualization. P.U., R.R., and T.T. involved in methodology. R.R. and P.U. involved in analysis. P.U. involved in data collection. P.U. and T.T. involved in writing—original draft preparation. P.U., R.R., B.B., and T.T. involved in writing—review and editing. B.B. and T.T. involved in supervision. All authors have read and agreed to the published version of the manuscript.

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CONFLICT OF INTEREST

The authors declare that they have no competing interests.

DATA AVAILABILITY STATEMENT

The data presented in this study are available on request from the corresponding author. The data are not publicly available due to institutional ethics policy.

PATIENT CONSENT

All participants gave informed consent to participate in the study.

ORCID

Piotr Kazimierz Urbański  <https://orcid.org/0000-0003-0579-3065>

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