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Psychological Rest in Student-Athletes: Relationships Between Sport Demands, Mental Rest, Depressive Symptoms, and Well-Being

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The purpose of this study was to explore how sport demands and psychological aspects of rest are related to depressive symptoms and well-being among female college athletes. Eccles and Kazmier (2019) proposed that physical and psychological (i.e., cognitive and emotional) demands of sport negatively affect perceptions of being mentally rested, which in turn reduce well-being and elicit depressive symptoms. They also proposed that engaging in resting experiences buffers negative effects of sport demands on perceptions of being mentally rested. These model predictions were tested in this study. Female athletes (*N* = 179) in NCAA Division I sports provided online responses to the Demand-Induced Strain Compensation Questionnaire for Sport (Balk et al., 2018), Center for Epidemiologic Studies Depression Scale (Radloff, 1977), and Mental Health Continuum-Short Form (Keyes et al., 2008). They also completed measures of perceptions of recent resting experiences and perceived current level of mental rest that were developed for this study. Results showed that emotional demands but not physical or cognitive demands, significantly predicted current level of mental rest. Also, recent resting experiences significantly predicted current level of mental rest but did not significantly moderate the relationship between sport demands and current level of mental rest. Finally, athletes who reported a lower current level of mental rest experienced a lower level of well-being and more depressive symptoms. Monitoring of emotional demands and engaging in key psychological resting experiences might be useful for athletes as they attempt to obtain adequate mental rest and stay healthy mentally.

Keywords: college athletes, mental health, recovery

College student-athletes have a lifestyle of high demands and intense pressure, which can have an impact on their performance in both the athletic and academic domain (Bird et al., 2018; Humphrey et al., 2000). These high demands can be physically (e.g., muscle pain), cognitively (e.g., decreased attentional capacity), and emotionally (e.g., anxiety) taxing in ways that increase the need for recovery (Balk et al., 2017). Thus, adequate recovery, defined as a state in which the physical and mental resources diminished by engagement in sport are subsequently replenished, is important for student-athlete performance and health (Eccles et al., 2022). For athletes, research indicates that inadequate recovery can contribute to the onset of overtraining syndrome, where symptoms include fatigue, performance decline, and mood disturbances (Meeusen et al., 2013), and burnout, which is an experiential syndrome characterized by emotional and physical exhaustion, a sense of reduced accomplishment, and a devaluation of participation in one's sport (Eklund & DeFreese, 2015). Inadequate recovery and in turn overtraining and burnout are also associated with decreases in sport performance and well-being and increases in depressive symptoms (Eklund & DeFreese, 2015; Nixdorf et al., 2021).

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A substantial body of evidence suggests that physical activity (PA) can be an effective non-clinical intervention for reducing symptoms associated with poor mental health (see Wegner et al., 2014 for a review of meta-analyses). Physical activity refers to any movement that increases energy expenditure, with exercise being one sub-category of PA and is defined as structured, repetitive, and planned bodily movements undertaken for the

primary goal of increasing physical fitness (Caspersen et al., 1985). Research across a broad spectrum of mental health symptoms and populations has generally found that PA can help to reduce psychological distress (e.g., Morres et al., 2019), as well as anxiety and depression symptoms (e.g., Wegner et al., 2014). Furthermore, there is also evidence to suggest that PA can have mood-enhancing benefits (Chan et al., 2019) and can improve positive affect and psychological well-being (Elkington et al., 2017). In university students, a range of cross-sectional studies have identified positive relationships between levels of PA and mental health, whereby students who engage in PA more frequently report better mental health and well-being (e.g., Budzynski-Seymour et al., 2020; Murphy et al., 2018). This evidence suggests that strategies to increase levels of PA could not only enable students to reap the considerable physical health benefits associated with engagement in PA (e.g., Reiner et al., 2013) but also have a positive impact on their mental health.

Additionally, research reviews indicate that perceptions of the demands placed upon student-athletes by their sport can affect their mental health (Kegelaers et al., 2022). Specifically, psychological (e.g., role strain), social (e.g., moving away from home), financial (e.g., need to engage in additional vocational activities), academic (e.g., tasks and assignments), and performance (e.g., roster selection) demands all affect the mental health of student-athletes. These demands may be of greater concern in relation to female student-athletes because women, and young women in particular, experience greater depression (Hyde & Mezulis, 2020) and lower levels of well-being (Batz & Tay, 2018) than men. For example, Salk et al. (2017) meta-analyses indicate that women aged 16-19 years and aged 20-29 years are, respectively, 2.69 and 1.93 times more likely to experience depressive symptoms than age-matched men. Similar results have been obtained from research on gender differences in depression in athletes, including NCAA Division I student-athletes (for reviews, see Kegelaers et al., 2022; Perry et al., 2021). For example, Wolanin et al. (2016) reported that female athletes at the Division I level were 1.84 times more likely to report depressive symptoms than male athletes. Though there is little research on gender differences in well-being in student-athletes, Belz et al.'s (2018) study of German state and national athletes in different age categories (under 18, 18-20, 21-24, 25-40, & over 40 years) revealed that female athletes had significantly lower well-being than male athletes generally, and especially so for athletes aged 21-24 years, which approximates college age. The causes of gender differences in depression and well-being in both the general and athlete populations are not well understood but most explanatory frameworks include a combination of biological (e.g., hormonal differences), structural (e.g., inequality of training opportunities), and sociocultural (e.g., gender role expectations) factors (Hyde & Mezulis, 2020; Perry et al., 2021). One additional explanation is underreporting by men of depressive symptoms perceived as unmasculine (e.g., crying), but research suggests that this accounts for only a small proportion of the observed gender differences (Hyde & Mezulis, 2020).

Though female athletes appear at a higher risk in terms of greater depression and lower well-being compared to male athletes, relatively little attention has been paid to female athletes within the sports sciences generally (Cowley et al., 2021) and health conditions affecting female athletes in particular (Wolanin et al., 2016). For example, in their review, Kuttel and Larsen (2020) counted male and female participants across all extant studies of athlete mental health and found that twice as many males as females had participated in these studies. As Blodgett et al. (2014) observed, male athletes are typically considered the norm and as such are privileged within society, while female athletes are subordinated, considered exotic, and referred to as "other" athletes. As such, there is a clear need for research on the health and well-being of female athletes, which includes considerations of how these athletes recover from the considerable demands imposed by their sport.

Rest, which has both psychological and physical aspects, is considered to be a key component of recovery in athletes (Eccles, 2021; Kellmann et al., 2018). Psychological rest involves reduced psychological demands, whereas physical rest involves reduced physical demands. Researchers have proposed that "complete rest" is "the only efficient remedy" for overtraining (Hausswirth & Mujika, 2013, p. viii). Also, "genuine rest", which involves minimizing physical training and cancelling competitions, is a key treatment for burnout (Goodger & Kentta, 2010, p. 135). Empirical research appears to support these proposals, indicating that experiences of the overtraining and burnout syndromes are less likely if sufficient rest is provided within training and competition regimens (e.g., Cresswell & Eklund, 2007), presumably because rest involves a break from the contextual characteristics including prolonged sport demands that give rise to these syndromes.

Within the recovery literature, rest typically has been associated with "inactivity" (e.g., Kellmann et al., 2018), which is defined as the cessation or reduction of *physical* participation in training and competition. By

comparison, only recently have researchers turned their attention to better understanding what constitutes rest in psychological terms. As such, as a component of the recovery process, the psychology of rest is relatively under-researched in the field of sport psychology, yet holds theoretical and practical importance (Eccles et al., 2022).

Recently, however, Eccles and Kazmier (2019) proposed an initial model of the psychology of rest in athletes, and conducted qualitative, interview-based research to determine the experiences that female student-athletes associated with the concept of "mental rest" (i.e., the psychology of rest). An initial model of the psychology of rest proposed a distinction between: (a) an athlete's current level of mental rest (i.e., an experiential psychological state), and (b) a process of mentally resting that affects the athlete's level of psychological rest. In terms of an athlete's level of rest, mentally well-rested athletes reported feeling "fresh", valuing and appreciating their sport, being highly motivated to engage in their sport, applying a lot of effort to their sport, and enjoying their sport (Eccles & Kazmier, 2019). By contrast, athletes described being poorly rested as feeling "tired", not really valuing or appreciating their sport, lacking motivation, not applying much effort, and not finding much enjoyment in their sport. In addition, the model proposed that being chronically and poorly rested leads to poor health and well-being presenting as deleterious experiences of cognitive fatigue, lack of control, tedium, and stress and frustration from performance demands. The process of resting was proposed to depend on engagement in sleep and wakeful resting experiences. These wakeful resting experiences, which were identified as the primary components for the proposed process of mentally resting, included: (a) reduction in thinking about one's sport, (b) reduction in effortful thinking, (c) assuming internal control, (d) experiencing variety in one's daily routine, (e) reduction in stress associated with work-related opportunity costs, and (f) reduction in frustration associated with personal opportunity costs (Eccles & Kazmier, 2019).

In summary, the research reviewed here suggests that increases in sport demands might lead to decreases in feelings of being mentally rested, which in turn might lead to increases in depressive symptoms and decreases in well-being, which is of particular concern for female athletes who experience greater depression and poorer well-being. However, engaging in the process of resting might moderate the effects of sport demands on feelings of being mentally rested, with beneficial consequences in terms of depression and well-being.

Aim and Hypotheses

The aim of this study was to provide a first test of the model of the psychology of rest in athletes (Eccles & Kazmier, 2019). The following model-derived hypotheses were tested: (a) athletes reporting higher recent physical, cognitive, and emotional sport-related demands would report feeling less well-rested mentally, (b) recent engagement in psychological resting experiences would moderate the relationship between perceived demands and feeling mentally rested, and (c) student-athletes who reported feeling more mentally rested would report fewer depressive symptoms and higher levels of well-being.

Note that there are no established measures of rest and as such there is a need for the development of such measures. Measure development should be well grounded conceptually and therefore should not be groundlessly embarked upon. Given that the model proposed by Eccles and Kazmier (2019) is a new model such that its potential viability and utility are open questions at this point, we did not believe that we had the solid theoretical grounding needed to embark on formal measure development, particularly when considering the time and resources required for this endeavor. Instead, we used some initial exploratory measures in the present study to investigate the model's potential viability and utility with the aim of using the study findings to inform future decisions about whether more meaningful pursuit of the model is worthwhile, which would include engaging in more formal measure development procedures.

Method

Participants

Inclusion criteria specified that participants must be female NCAA Division I athletes, at least 18 years of age, in-season, and on the active roster for their respective programs. To ensure these criteria were met, prospective participants were asked to respond to demographic questions including NCAA division level, age, and season status at the beginning of the Qualtrics survey. If their responses did not meet the aforementioned inclusion criteria, they were redirected to the end of the survey. Prospective participants were not screened for mental health disorders.

Participants were 179 female Division I athletes aged 20.01 years on average (*SD* = 1.45) and averaged 10.31 years (*SD* = 4.50) of involvement in their sport. They included 39 (22%) freshman, 49 (27%) sophomores,

36 (20%) juniors, 42 (23%) seniors, and 13 (7%) graduate students. In terms of race, 136 (76%) participants were White, 12 (7%) African American, 10 (6%) Hispanic or Latinx, six (3%) Asian, and 13 (7%) of mixed race. Participants were athletes in track and field (*n* = 42), soccer (*n* = 28), softball (*n* = 19), cross country (*n* = 13), indoor volleyball (*n* = 13), swimming and diving (*n* = 11), tennis (*n* = 11), golf (*n* = 8), gymnastics (*n* = 7), beach volleyball (*n* = 6), ice hockey (*n* = 6), rowing (*n* = 5), lacrosse (*n* = 2), basketball (*n* = 2), field hockey (*n* = 2), and snow skiing (*n* = 1).

Measures

Sport-Related Demands

The demands subscales of the Demands-Induced Strain Compensation Questionnaire for Sport (DISQ-Sport; Balk et al., 2018) were used to measure athletes' perceptions of sport-related demands. Balk et al. (2018) adapted this instrument from the original DISQ (De Jonge et al., 2007). The DISQ-Sport consists of three demands subscales including physical demands, cognitive demands, and emotional demands each comprising four self-report items. The introductory statement was adapted to delimit responses on all subscales to the last two weeks. Athletes were then asked to indicate the extent to which their sport requires them to deal with those three types of demands. Example items for each subscale include: (a) "In my sport, I have to expend a lot of physical effort" (physical demands subscale), (b) "In my sport, I have to expend a lot of mentally taxing effort" (cognitive demands subscale), and (c) "In my sport, I have to deal with a negative atmosphere within the group I belong to" (emotional demands subscale). Responses were given on a 5-point Likert scale that ranged from 1 (never) to 5 (almost always). Balk et al.'s (2018) analyses of the DISQ-Sport not only indicated that acceptably reliable data were obtained on each subscale, but that the data also exhibited factorial invariance across sport type, competition level, and language.

Perceptions of Recent Experiences of Psychological Rest

Eccles and Kazmier (2019) identified that, for athletes, six resting experiences are involved in the process of resting psychologically. These experiences included (a) reduction in thinking about one's sport, (b) reduction in effortful thinking, (c) assuming internal control, (d) experiencing variety, (e) reduction in stress associated with work-related opportunity costs, and (f) reduction in frustration associated with personal opportunity costs. The extent to which athletes in this investigation engaged in these experiences in the last two weeks was measured using a researcher-developed questionnaire. First, one researcher drafted items that she felt captured engagement in each of the six resting experiences as described by Eccles and Kazmier (2019). Then, the draft of each item was refined through discussion with a second researcher. For example, engagement in the resting experience of "a reduction in thinking about one's sport" was measured by the item, "In your free time over the last two weeks, how frequently have you been able to spend time thinking about something other than your sport?" When responding to each item, athletes were asked to think about their free time outside of training, competitions, and class schedule over the last two weeks. Responses to each item were obtained via a visual analogue scale ranging from 0 (never) to 4 (always) and were captured to two decimal places (e.g., 2.27). No pilot testing of this measure was undertaken. As such, the data presented in the present study are the first available data yielded by this measure.

Perceived Level of Mental Rest

The degree to which an athlete felt mentally rested was measured using a single researcher-developed item. In their study, Eccles and Kazmier (2019) interviewed athletes about their experiences of being poorly and well rested. In their report of the study, these researchers presented athletes' common responses concerning these experiences. In the current study, participants were provided with brief versions of these descriptions of being poorly rested at one end of a visual analogue scale, which included feeling tired, not really valuing or appreciating my sport, lacking the motivation to engage in my sport, not applying much effort to my sport, and not enjoying my sport very much. At the other end of the scale, participants were provided with brief versions of the descriptions of being well-rested, which included feeling fresh, valuing and appreciating my sport, feeling highly motivated to engage in my sport, applying a lot of effort to my sport, and enjoying my sport a lot. A single-item response was given on a scale ranging from 0 (poorly rested) to 4 (well-rested), where responses were captured to two decimal places (e.g., 2.27). Participants were asked to consider the different descriptions for feeling poorly rested or well-rested and then indicate their current level of mental rest on the scale. No pilot testing of this measure was undertaken. As such, the data presented are the first available data yielded by this measure.

Depressive Symptoms

The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) was used to measure

depressive symptoms among student-athletes. The CES-D consists of 20 self-report items used to measure depressive symptoms over the last week and is representative of multiple dimensions of depression (Edwards et al., 2010). Participants respond to items such as "I had trouble keeping my mind on what I was doing" on a 4-point Likert scale ranging from 0 (rarely or none of the time; <1 day) to 3 (most or all of the time; 5-7 days). Before computing mean or sum score, items measuring positive affect (i.e., items 4, 8, 12, and 16) are reverse-coded. Then, item responses are typically summed to achieve a total score, which ranges from 0 to 60, with higher scores signifying greater severity of depression. However, in this study, we used the average score of the items so that we could compare the average score directly against the response scale. Because the CES-D was developed to measure recent level of symptomology, scores are expected to vary over time, which makes the test-retest reliability moderate, ranging between .45 and .70, depending on time interval (Radloff, 1977). Data obtained with the CES-D have been demonstrated to have high internal consistency reliability, with a Cronbach's alpha coefficient of .85 among the general population and .90 among patient samples (Radloff, 1977).

Well-Being

The Mental Health Continuum-Short Form (MHC-SF; Keyes et al., 2008) was used to measure well-being as experienced over the last month. The MHC-SF is a 14-item self-report questionnaire for assessing positive mental health on three dimensions (i.e., psychological, social, and emotional) and is adapted from the Mental Health Continuum-Long Form. Example items for each dimension include: (a) "During the past month, how often did you feel confident to think or express your own ideas and opinions" (psychological well-being), (b) "During the past month, how often did you feel that people are basically good" (social well-being), and (c) "During the past month, how often did you feel interested in life" (emotional well-being). Responses are provided on a 6-point Likert scale ranging from 0 (never) to 5 (every day). Typically, item responses are summed to produce a total response score that can range from 0 to 70. However, in this study, we used the average score of the items to compare the average score directly against the response scale. Data obtained with the MHC-SF have demonstrated high internal consistency reliability, with Cronbach's alpha coefficients greater than .80 having been observed for each subscale (Robitschek & Keyes, 2009). Additionally, the three-factor structure of the measure has been supported by data collected from many populations including the US adult (Gallagher et al., 2009) and college student populations (Robitschek & Keyes, 2009).

Procedure

Ethics approval for this study was obtained from the University's Institutional Review Board. The lead researcher identified the email addresses of the 1695 coaches of women's sports listed on the online directory of 201 NCAA Division I schools (NCAA, 2022). From October 2020 through January 2021, emails were sent out to each coach providing a brief overview of the study and an electronic link to the survey hosted by Qualtrics. Coaches were asked to pass the study information on to the athletes they coach. At the beginning of the Qualtrics survey, athletes were asked to identify their season status as one of the following: (a) in-season (20hr/week), (b) out of season (8hr/week), or (c) inactive (0hr/week). Data collected during the October 2020 to January 2021 timeframe consisted entirely of "in-season (20hr/week)" responses. This information specified that participation was entirely unrelated to athlete selection for competition. Athletes willing to participate followed the electronic link to the survey. Following provision of consent, athletes completed the questionnaire measures. The questionnaires were randomly ordered to reduce order effects.

Data Analysis

First, descriptive statistics for all study variables were computed. Pearson correlation coefficients between all study variables were reported and tested for statistical significance via a two-tailed test. Second, exploratory factor analysis was conducted to establish the factor structure for the resting experiences measure. Finally, three rational sequential entry (i.e., hierarchical) regression analyses were applied to assess the extent to which (a) the three forms of sport demands predicted perceived level of mental rest and (b) the resting experiences moderated the relationships between sport demands and perceived level of mental rest. All statistical analyses were conducted in SPSS version 26.0. Cleaning of the data (N = 179), which occurred prior to running all analyses, involved observing the data set for missing values and coding the missing data. Only three cases (i.e., 1.7% of the data set) had variables with missing values. The Little's MCAR test was not significant, χ^2 (16) = 29.56, p > .01. Given the small portion of missing data and non-significance of the MCAR test, the listwise deletion method was employed for regression analyses.

Results

Descriptive Statistics

Table 1 displays Pearson correlation coefficients between the study variables. Table 2 displays the sample size, mean, standard deviation, and internal consistency reliability coefficient for each study variable. All measures with multiple items had acceptable internal consistency reliability with alpha coefficients greater than .70 (see Table 2). Participants reported experiencing physical demands in the last two weeks at a value between "sometimes" and "often" (*M* = 3.48; *SD* = .83), cognitive demands at a value that was almost often (*M* = 3.86; *SD* = .95), and emotional demands at a value that was just above rarely (*M* = 2.23; *SD* = .92). Participants reported experiencing physical rest at a value that was just above "sometimes" (*M* = 2.11; *SD* = .72) and mental rest just above the halfway point between poorly rested and well-rested (*M* = 2.36; *SD* = .87). Depressive symptoms in the last week were experienced just below "some of the time/1-2 days" (*M* = .96; *SD* = .55). With regard to well-being, in the last month, positive mental health was experienced about 2 or 3 times a week (*M* = 3.23; *SD* = .93).

Exploratory Factor Analysis (EFA)

The inter-item correlations among the six resting experience variables indicate that most of the resting experience variables were moderately or strongly correlated (see Table 1). However, variable RE5 (reduction in stress associated with work-related opportunity costs) was weakly correlated with the other five variables (all $r < .30$) and with the total score, suggesting that the item might reflect a construct that differs from the ones reflected by the other items on the scale. To determine how to most appropriately represent the resting experiences in the planned regression models, exploratory factor analyses were performed using Principal Axis Factoring extraction method with oblique rotation (when there were at least two factors). Principal Axis Factoring is a commonly used extraction method and is appropriate for the current analysis because it focuses on latent factors that explain common variance among items (e.g., Henson & Roberts, 2006). When multiple factors are needed, oblique rotation is used to allow factors to be correlated because we do not have a theory that factors are uncorrelated. Item scores were on an interval scale and did not deviate from normality: Skewness ranged from -0.79 to 0.28 and kurtosis ranged

Table 1. Correlation Matrix for Study Variables

Variable	CDemands	EDemands	RE1	RE2	RE3	RE4	RE5	RE6	RE	MR	CES-D	MHC-SF
PDemands	.60**	.18*	-.12	-.06	-.20**	-.09	-.07	-.16*	-.15*	.04	.04	.06
CDemands	-	.24**	-.06	-.05	-.16	-.04	-.04	-.09	-.09	-.02	.02	.08
EDemands	-	-	-.16*	-.21**	-.21**	-.17*	-.13	-.25**	-.25**	-.30**	.29**	-.25**
RE1	-	-	-	.34**	.26**	.30**	.27**	.35**	.42**	.09	-.28**	.30**
RE2	-	-	-	-	.55**	.45**	.20**	.46**	.58**	.26**	-.40**	.37**
RE3	-	-	-	-	-	.67**	.20**	.54**	.65**	.17*	-.34**	.31**
RE4	-	-	-	-	-	-	.20**	.58**	.64**	.19*	-.38**	.42**
RE5	-	-	-	-	-	-	-	.27**	.30**	-.01	-.17*	.13
RE6	-	-	-	-	-	-	-	-	.64**	.22**	-.39**	.38**
RE	-	-	-	-	-	-	-	-	-	.25**	-.46**	.47**
MR	-	-	-	-	-	-	-	-	-	-	-.49**	.40**
CES-D	-	-	-	-	-	-	-	-	-	-	-	-.75**

Note. *$p < .05$, **$p < .01$; PDemands = Physical demands; CDemands = Cognitive demands; EDemands = Emotional demands; RE1 = Reduction in thinking about one's sport; RE2 = Reduction in effortful thinking; RE3 = Internal control; RE4 = Variety; RE5 = Reduction in stress associated with work-related opportunity costs; RE6 = Reduction in frustration associated with personal opportunity costs; RE = Resting experiences; MR = Mental Rest; CES-D = Depressive symptoms scale; MHC-SF = Well-being scale; Correlations between RE and RE1-RE6 were corrected item-total correlations with the item being deleted.

from -0.89 to 0.28. The sample data were adequate for conducting EFA, as evidenced by Kaiser-Meyer-Olkin = .81, and Bartlett's test statistic = 294.37, $df = 15$, $p < .05$. One factor was suggested based on the eigenvalue >1 rule (Kaiser, 1960) since the first two largest eigenvalues were 2.97 and .97. Parallel analysis using 500 random datasets and the 95th percentile of eigenvalues for comparison also revealed a one-factor solution. Factor loadings from the one-factor model ranged from .32 (RE5) to .78 (RE3). The RE5 item was the only one with a factor loading smaller than .40. Using loading ≥ .40 to determine a meaningful weight on a factor (Henson & Roberts, 2006), RE5 was considered a weak indicator. Therefore, the one-factor model including variables RE 1, 2, 3, 4, and 6 was re-run. The five-item one-factor model explained 47.22% of total variance. The factor loadings were sufficiently large (> .40). We also conducted a two-factor EFA model, but it failed to yield a meaningful interpretation regardless of including RE5. Specifically, only one item had a large loading on a factor; all other items had large loadings on the second factor. RE5 continued to be problematic as it did in the one-factor model. Therefore, we chose the one-factor model with five items and concluded that the five-item scale was unidimensional. The mean of five item scores was computed to represent resting experience and then used in the regression models. The alpha coefficient was .81 for the five-item scale.

Main Analyses

For the main analysis, three hierarchical regressions were run to test our hypotheses. For each analysis, the assumption of linearity was examined by checking the scatterplots between the outcome variable and predictors. In addition, residuals were checked for the assumptions of normality and homoscedasticity. The assumptions appeared to be tenable for each analysis based on the overall linear patterns observed in the scatterplots, approximately normal distribution of residuals, and roughly equal spread of residuals around the zero mean across predicted outcome values.

To test the hypotheses that physical demands would predict perceived level of mental rest and that the resting experiences would moderate this relationship, the predictor physical demands was added to the first block, and resting experiences and the interaction term between resting experiences and physical demands were entered into the second block. The hierarchical regression results reported in Table 3 indicate that physical demands alone had no significant effect on perceived level of mental rest, $F_{(1, 175)} = .214$, $p = .644$, $R^2 = .001$. The model with all three predictors explained a significant amount of variance in perceived level of mental rest, $F_{(3,173)} = 4.074$, $p = .008$, $R^2 = .066$. Adding resting experiences and the interaction term explained an additional 6.5% of variance in perceived level of mental rest. However, the only significant predictor of perceived level of mental

Table 2. Descriptive Statistics for Study Measures

Variable	*n*	*M*	*SD*	α
PDemands	178	3.48	.83	.74
CDemands	178	3.86	.95	.86
EDemands	178	2.23	.92	.85
RE	179	2.11	.72	.81
Mental rest	178	2.36	.87	-
CES-D	178	.96	.55	.90
MHC-SF	179	3.23	.93	.92
Valid N (listwise)	176			

Note. PDemands = Physical demands (Scale range = 1, denoting never – 5, denoting almost always); CDemands = Cognitive demands (Scale range = 1, denoting never – 5, denoting almost always); EDemands = Emotional demands (Scale range = 1, denoting never – 5, denoting almost always); RE = Resting experiences (Scale range = 0, denoting never – 4, denoting always); Mental rest = Perceived level of mental rest scale (Scale range = 0, denoting poorly rested – 4, denoting well-rested); CES-D = Depressive symptoms scale (Scale range = 0, denoting rarely – 3, denoting most or all of the time); MHC-SF = Well-being scale (Scale range = 0, denoting never – 5, denoting every day). The alpha coefficient for RE does not include Item 5, which was removed from the scale, as described in the Exploratory Factor Analysis subsection of the results.

Table 3. Hierarchical Regression Results for Physical Demands

Variable	Unstandardized Coefficient	Standard Error	Standardized Coefficient	*p*	Correlations		R^2	$\triangle R^2$
					Partial	Part		
Step 1							.001	-
Intercept	2.355	.065		<.001				
PDemands	.037	.080	.035	.644	.035	.035		
Step 2							.066	.065
Intercept	2.366	.065		<.001				
PDemands	.085	.079	.080	.285	.081	.079		
RE	.307	.091	.253	.001	.249	.248		
PDemands*RE	.075	.117	.047	.522	.049	.047		

Note. n = 176; PDemands = Physical demands; RE = Resting experiences.

Table 4. Hierarchical Regression Results for Cognitive Demands

Variable	Unstandardized Coefficient	Standard Error	Standardized Coefficient	*p*	Correlations		R^2	$\triangle R^2$
					Partial	Part		
Step 1							.000	-
Intercept	2.354	.065		<.001				
CDemands	-.013	.069	-.015	.848	-.015	-.015		
Step 2							.059	.059
Intercept	2.360	.064		<.001				
CDemands	.004	.069	.005	.952	.005	.004		
RE	.292	.090	.240	.001	.239	.239		
CDemands*RE	.041	.092	.034	.655	.034	.033		

Note. n = 176; CDemands = Cognitive demands; RE = Resting experiences.

Table 5. Hierarchical Regression Results for Emotional Demands

Variable	Unstandardized Coefficient	Standard Error	Standardized Coefficient	*p*	Correlations		R^2	$\triangle R^2$
					Partial	Part		
Step 1							.087	-
Intercept	2.352	.062		<.001				
EDemands	-.282	.069	-.296	<.001	-.296	-.296		
Step 2							.116	.028
Intercept	2.353	.064		<.001				
EDemands	-.238	.071	-.249	.001	-.246	-.239		
RE	.212	.090	.174	.020	.176	.168		
EDemands*RE	-.009	.100	-.006	.930	-.007	-.006		

Note. n = 176; EDemands = Emotional demands; RE = Resting experiences.

rest was the resting experiences, with standardized slope $b^* = .253$, $p < .01$. Therefore, we reject the hypotheses that physical demands would predict perceived level of mental rest and that the resting experiences would moderate that relationship.

We also hypothesized that cognitive demands would predict perceived level of mental rest and that the resting experiences would moderate this relationship. To test these hypotheses, the second hierarchical regression analysis was conducted in which the predictor cognitive demands was entered into the first block and resting experiences and the interaction term between resting experiences and cognitive demands were entered into the second block. As shown in Table 4, cognitive demands had no significant effect on the outcome variable, $F_{(1,\ 175)} = .037$, $p = .848$, $R^2 = .000$. Adding resting experiences and the interaction term between resting experiences and cognitive demands to the regression analysis explained an additional 5.9% of variance in perceived level of mental rest. However, the only significant predictor of perceived level of mental rest was the resting experiences, $b^* = .240$, $p < .01$. Therefore, we reject the hypotheses that cognitive demands would predict perceived level of mental rest and that the resting experiences would moderate that relationship.

Similar hierarchical regression analysis was conducted to test the hypotheses that emotional demands would predict perceived level of mental rest and that the resting experiences would moderate this relationship. As shown in Table 5, emotional demands were a significant predictor of perceived level of mental rest, $F_{(1,\ 175)} = 16.748$, $p < .001$, $R^2 = .087$. Adding resting experiences and the interaction term between resting experiences and emotional demands to the regression analysis explained an additional 2.8% of variance in perceived level of mental rest. The interaction term did not significantly predict perceived level of mental rest. However, both emotional demands ($b^* = -.249$, $p < .01$) and the resting experiences ($b^* = .174$, $p < .05$) were significant predictors. Therefore, we retain the hypothesis that emotional demands would predict perceived level of mental rest but reject the hypothesis that the resting experiences would moderate the emotional demands-mental rest relationship.

We also hypothesized that perceived level of mental rest would be negatively related to depressive symptoms but positively related to well-being. Pearson correlations were used to examine these relationships. The results support these hypotheses in that perceived level of mental rest was significantly negatively and moderately correlated with depressive symptoms, $r = -.49$ ($p < .01$; $n = 178$) and significantly positively and moderately correlated with well-being, $r = .40$ ($p < .01$; $n = 179$). Thus, we retain both hypotheses.

Discussion

The aim of this study was to explore the link between sport-related demands, psychological resting experiences, and perceived level of mental rest. The results of our study showed that among female student-athletes, the average reported value for cognitive demands was 3.86 (*SD* = .95), for physical demands was 3.48 (*SD* = .83), and for emotional demands was 2.23 (*SD* = .92). These values are quite comparable to those reported by Balk et al. (2020) who surveyed 118 male and female semi-professional and professional athletes. Balk et al. (2020) found that the average reported value for cognitive demands was 4.07 (*SD* = .62), for physical demands was 3.30 (*SD* = .77), and for emotional demands was 2.36 (*SD* = .59). On average, student-athletes seem to be engaging in psychological resting experiences only some of the time (*M* = 2.11, *SD* = .72), which is to be expected given their concurrent commitments. Finally, the results of our study showed that among female student-athletes, the average reported value for perceived level of mental rest was 2.36 (*SD* = .87).

Based on the model by Eccles and Kazmier (2019), it was hypothesized that athletes reporting greater sport-related demands would report feeling less well-rested mentally. In line with this hypothesis, the emotional demands variable was a significant, inverse predictor of perceived level of mental rest. However, by contrast, the physical demands and cognitive demands variables did not significantly predict perceived level of mental rest. The reason for these results is unclear. It is possible that, when compared to the psychological effects of physical and cognitive demands, the effects of emotional demands are more chronic. The emphasis of the emotional demands subscale within the DISQ-Sport is on recent experiences of challenging (e.g., angry & negative) social interactions involving teammates and coaches. These types of interactions likely lead to recurring post-event rumination, which prolong physiological activation and thus lower perceptions of feeling mentally rested (Kinnunen et al., 2017). By contrast, it is possible that effects of physical and cognitive demands do not include prolonged rumination and thus dissipate more rapidly.

We also hypothesized that recent engagement in psychological resting experiences would moderate the relationship between sport-related demands and perceived level of mental rest. While recent resting

experiences were a significant positive predictor of perceived level of mental rest, recent resting experiences were not a significant moderator between sport-related demands and perceived level of mental rest. The reason for these results is unclear. It is possible that when compared to the effects of recent resting experiences on perceived level of rest, sport-related demands have a greater effect on rest level and thus a propensity to disrupt the resting process. This reiterates the importance of using a mental rest plan to monitor changes in rest level and resting experiences (Eccles et al., 2021), especially when sport-related demands are high.

With regard to depressive symptoms, a total item score is normally reported for the CES-D but we reported the average of the 20 items so that we could compare this value against the response scale. The cut-off recommended by Radloff (1977) for risk of clinical depression is 16 or higher; thus, the averaged cut-off score is .80. Additionally, the cut-off for moderate to severe levels of depressive symptoms is 27 or higher (Wolanin et al., 2016); thus, the averaged cut-off score is 1.35. The prevalence of individuals reporting clinically relevant depressive symptoms (CES-D ≥ .80) in our sample was 56.4% (n = 101), while the prevalence of individuals reporting moderate to severe levels of depressive symptoms (CES-D ≥ 1.35) was 22.9% (n = 41). These prevalence levels are notably higher than those found in Wolanin et al.'s (2016) study of 263 female Division I athletes, which were 28.1% for clinically relevant depressive symptoms and 7.5% for moderate to severe levels of depressive symptoms. We suggest three possible explanations for these differences between studies. The first explanation involves a selection effect. Recruitment in our study depended upon athletes becoming interested in our study after reading about it and then actively taking steps to complete the study. As such, we might have recruited athletes motivated to participate because they were experiencing increased depressive symptoms. By contrast, Wolanin et al. asked all athletes completing a required college medical assessment to participate and consequently their sample might have been more representative of the general female college athlete population. Second, Wolanin et al.'s study was published in 2016 and our data were collected in 2021, and research indicates that US college students are reporting more mental health concerns over time (Duffy et al., 2019), with the Covid-19 pandemic exacerbating this trend (Son et al., 2020). Finally, evidence suggests that athletes in individual sports report greater depression than those in team sports (Hoffmann et al., 2022) and Wolanin et al.'s study involved a smaller percentage of individual sport athletes (27%) than our study (52%). However, when we compared depressive symptoms and well-being between the individual sport (e.g., track & field) and team sport (e.g., soccer) athletes in our sample, we found very small and non-significant effects of sport type on these variables.

With regard to well-being, on the MHC-SF, individuals can be classified as "flourishing" or "languishing" depending on scoring criteria proposed by Keyes (2009). According to these criteria, 45.25% (n = 81) of our sample were "flourishing", 3.91% (n = 7) were "languishing", and 50.84% (n = 91) were "neither flourishing nor languishing" (i.e., they had only moderately positive mental health). It is notable that 37 of the 41 participants who reported moderate to severe depression via the CES-D (see above) also reported that they were either "languishing" or "neither languishing nor flourishing." These findings concerning depressive symptoms and well-being in female athletes are concerning and highlight the need for more studies of the kind we have conducted here that attempt to identify factors affecting the health of female athletes.

The results of our study were in line with the hypothesis that student-athletes who report feeling more mentally rested would show fewer depressive symptoms. Perceived level of mental rest was moderately and negatively related to self-reported depressive symptoms. This finding is consistent with existing literature in which highly demanding athlete lifestyles are associated with experiences of psychological distress and depression (Udry et al., 1997; Wolanin et al., 2016; Yang et al., 2007). Our results also supported the hypothesis that student-athletes who felt more mentally rested would report higher levels of well-being. Perceived level of mental rest was moderately and positively related to self-reported well-being. These two findings (i.e., concerning depressive symptoms and well-being) are consistent with Eccles and Kazmier's (2019) model in which feeling mentally rested is associated with athlete health and well-being.

Research has provided evidence that insufficient recovery in athletes can lead to negative outcomes including overtraining and burnout syndromes and in turn decreases in sport performance and well-being and increases in depressive symptoms (Eccles et al., 2022; Eklund & DeFreese, 2015). These consequences of inadequate recovery prompted Eccles and Kazmier (2019) to focus on the under-researched component of the recovery process (i.e., psychological rest). They

conducted research on the psychological aspect of rest in which they identified key psychological resting experiences that play an important role in athletes' feelings of being mentally well-rested (Eccles & Kazmier, 2019). However, their study did not assess the extent to which athletes were engaging in these experiences, nor link this concept of psychological rest to potential outcomes. Our study contributes to the literature on rest and recovery by furthering the research on the psychological component of rest by exploring the relations between physical, cognitive, and emotional aspects of demands, psychological resting experiences, and current level of mental rest, and relate negative (depressive symptoms) and positive (well-being) outcomes in college student-athletes.

When considering the next steps in the research on the psychology of rest, the present study provided some support for the model proposed by Eccles and Kazmier (2019). Several predictions of the model were supported by the data such as finding that most forms of resting experience relate positively to perceptions of being rested, which in turn relate negatively with depressive symptoms and positively with well-being. However, some aspects of the model were not supported. In particular, one resting experience proposed in the model by Eccles and Kazmier (2019) was not significantly related to the remaining resting experiences nor with the hypothesized downstream variables including perceptions of being rested mentally. Consequently, there is an imperative to conduct further tests of the viability and utility of the model to enhance our understanding of the psychology of rest in athletes and before engaging in more formal measurement development procedures.

The results of our study imply that it may be worthwhile for athletes to monitor their experience of emotional demands because these appear to predict perceptions of mental rest, which are, in turn, associated with well-being and depressive symptoms. Sport psychology consultants could regularly monitor their athletes' emotional demands and teach their athletes to monitor themselves using the emotional demand scale employed here (i.e., Balk et al., 2018) as well as other validated scales created for this purpose (for a review, see Hamlin et al., 2019). Consultants could also promote greater awareness by athletes of the emotional demands they experience by supporting their development of emotional self-reflection skills. For example, to promote these skills in military performers, Crane et al. (2019) employed a 15-minute weekly writing session guided by reflection questions that asked the performers to describe a difficult event that they experienced during the previous week and then what they did to try to minimize the stress or maximize their performance in response to the event.

Another finding from this study was that resting experiences were positively related to perceptions of mental rest, which were in turn positively related with well-being and negatively related with depressive symptoms. So, it seems worthwhile to consider engaging in the types of resting experiences outlined by Eccles and Kazmier (2019) and measured here given the links between resting experiences and positive downstream outcomes. Eccles et al. (2021, 2022) recently made recommendations for how practitioners such as sport psychology consultants, coaches, athletic trainers, and sport medicine professionals can help athletes obtain these experiences. For example, thinking explicitly about rest in psychological terms will be relatively new to athletes and, consequently, practitioners should engage in psychoeducation on this topic with their athletes. More specifically, athletes would benefit from learning about several key principles concerned with the psychology of rest. First, avoiding burnout and overtraining, and maintaining health and well-being, depends in large part on effective recovery. Second, recovery does not just involve recovering physically but also involves recovering mentally. Third, athletes can achieve the mental rest they need if they engage in some key resting experiences. These resting experiences can then be introduced using the questions outlined in Table 6, which is based on the model proposed by Eccles and Kazmier (2019). Practitioners can then help athletes track their emotional demands (as described above), and when increased demands are identified, encourage engagement in the resting experiences outlined in Table 6.

Limitations and Future Research

Study limitations included the use of two instruments developed for the study, as described above. Second, with regard to the validity of the DISQ-Sport (Balk et al., 2018), the measure is also relatively new, and it is unclear at this time how measurements obtained via this measure converge with other measurements of sport demands; for example, how do athletes' perceptions of physical demands relate to their logs of recent training volume and competition schedules? Furthermore, this study only involved female collegiate athletes within the United States. While our study helps to answer calls for more research on women given their underrepresentation in the sport sciences (e.g., Cowley et al., 2021), it is unclear how these findings generalize beyond this specific

population and future research should address this shortcoming. For example, it is unknown whether gender shapes perceptions of sport-related demands, resting experiences, and level of mental rest. For instance, men of the same age group may perceive fewer emotional demands and more cognitive demands due to hormonal differences between the genders (Taylor, 2006).

Third, there was some non-correspondence of timeframes across measures used in this study. The DISQ-Sport (Balk et al., 2018), the perceptions of recent experiences of psychological rest questionnaire, and the perceived level of mental rest scale measures concern the previous two weeks. The CES-D (Radloff, 1977) measures depressive symptoms over the last week. The MHC-SF (Keyes et al., 2008) measures well-being as experienced over the last month. Valid recall for retrospective self-reports requires the engagement of both the episodic and semantic memory systems, meaning that this form of recall requires both spatio-temporal information gathered from the specific timeframe as well more general information (Walentynowicz et al., 2018). Thus,

Table 6. Questions designed to promote reflection in athletes about their engagement in psychological resting experiences

Question to ask your athlete	Why is this question relevant to helping your athlete rest mentally?	What can your athlete do to achieve this resting experience?
Does your athlete have a "switching-off" plan?	Resting involves "switching off" from constantly thinking about sport. Therefore, a key resting experience involves spending time thinking about something other than one's sport for a while.	Has your athlete planned to spend some time: (a) with people who are not their teammates and coaches? (b) in venues that do not include their training facility and where they cannot see their playbook, sport equipment, and apparel? (c) without viewing media and TV related to their sport?
Has your athlete arranged a "quiet zone"?	Resting involves giving your athlete's brain a break from thinking hard. Therefore, a key resting experience involves "doing not much slowly."	Has your athlete planned to spend time: (a) alone or with close friends or family with whom they can be themself? (b) doing activities that are fun and do not involve the need to think very hard (e.g., a favorite TV show)? (c) in a relaxed venue (e.g., bed, room, home, café) with few distractions?
Has your athlete scheduled some "me time"?	Resting involves giving your athlete a break from having the day structured and scheduled by someone else (e.g., their coach). Therefore, a key resting experience involves your athlete deciding what they want to do and when, where, and for how long they want to do it.	Has your athlete planned to spend some time: (a) doing what they want? (b) when they can be their real self? (c) when it's just fine to feel that they are doing nothing "useful" at all?
Is your athlete "doing it different"?	Resting involves a break from all the tedious aspects of being an athlete: same people, same gym, same schedule, same food, same bedtime, every day, all week, for weeks at a time. Therefore, a key resting experience involves enjoying some variety in one's life.	Has your athlete planned to spend some time: (a) following different (i.e., from normal) routines and travel routes? (b) with different people? (c) eating different food? (d) in different venues and locations?

the incongruence among measure timeframes could have impacted our results. Finally, burnout was not explicitly measured in the present study. Researchers should expand upon the current research by explicitly measuring burnout given evidence of its connection to rest, depression, and well-being.

Conclusion

Our study provides a first insight into relationships in athletes between sport-related demands, psychological resting experiences, and current level of mental rest, while also examining the extent to which being mentally rested is associated with depressive symptoms and well-being. The results of the study indicate that emotional demands but not physical or cognitive demands, significantly predict current level of mental rest. In addition, recent resting experiences significantly predict current level of mental rest but do not significantly moderate the relationship between sport demands and current level of mental rest. Finally, athletes who report a lower current level of mental rest experience a lower level of well-being and more depressive symptoms. Consequently, monitoring of emotional demands and engaging in key psychological resting experiences might be useful for athletes as they attempt to obtain adequate mental rest and stay healthy mentally.

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