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The independent effects of match location, match result and the quality of opposition on subjective wellbeing in under 23 soccer players: a case study

Abstract

This study examined if subjective wellbeing in soccer players was affected by match location, match result and opposition quality before a match (PRE), 1 day after (POST-1), and 3 days after a match (POST-3). Eleven professional male soccer players from the under 23 squad playing in the Premier League 2 division completed a wellbeing questionnaire before and after 17 matches. Match training load (session-rating perceived exertion) was not different, regardless of the location, result, or quality of opposition faced ($P>0.05$). Subjective wellbeing was not different at PRE ($P> 0.05$); however, at POST-1 and POST-3, stress and mood were ≥20% lower after playing away from home or losing ($P<0.05$). Stress, mood and sleep were ≥12% worse after playing against a higher-level opposition at POST-1. Coaches need to be aware that match location, match result and the quality of the opposition can influence post-match wellbeing, irrespective of match load.

Key words: Wellbeing; soccer; sport; winning; home.

Introduction

Professional soccer is characterized by high training loads, weekly competition, and frequent periods of congested fixtures (Nedelec et al., 2012; Lundberg & Weckström, 2017; Thorpe et al., 2017). High physical demands can leave players more susceptible to overtraining (Brink, Visscher, Coutts, & Lemmink, 2012), illnesses (Brink, Nederhof, Visscher, Schmikli, & Lemmink, 2010), injuries (Watson, Brickson, Brooks, & Dunn, 2016), and psychosocial disorders (Gouttebarge, Backx, Aoki, & Kerkhoffs, 2015), all of which might negatively affect both acute and longer-term performance (Brink et al., 2012; Nedelec et al., 2012; Thorpe et al., 2015). To minimise the potential deleterious effects of such high physical demands, and to assess a players performance readiness, individual training loads are closely monitored by utilising objective and/or subjective measurement tools (Saw, Main, & Gastin, 2016; Thorpe et al., 2015, 2017). Common measures of training load include the session-rating of perceived exertion (s-RPE) (Foster, 1998), global positioning systems (GPS) (Scott, Lockie, Knight, Clark, & Janse de Jonge, 2013) and subjective wellbeing questionnaires, that factor in perceived changes in mood, stress, fatigue, soreness and other psychometric indices (Hooper & Mackinnon, 1995; Saw et al., 2016). Tracking markers in response to changes in training load enables coaches to better manage a players fatigue status, performance readiness, and injury/illness risk, as they can subtlety modify their training between matches to facilitate restoration or adaptation, as necessary (Saw et al., 2016; Thorpe et al., 2017).

While it is likely that all the tools currently available to monitor training load-induced stress (e.g., GPS, s-RPE) can be useful, and that measuring them simultaneously is better than in isolation, subjective measures of a players wellbeing is one of the most attractive tools available. Indeed, subjective wellbeing scores not only have the advantage of being inexpensive, simple to administer, and for players to understand and complete, but they are also sensitive to daily, weekly and seasonal fluctuations in training load (Fessi et al., 2016; Saw et al., 2016; Watson et al., 2016). Furthermore, they are commonly reported as more sensitive when compared to costly, objective measures such as GPS (Saw et al., 2016; Thorpe et al., 2015). Although it has been established that subjective measures of wellbeing, such as mood and sleep are sensitive to changes in training load (Fessi et al., 2016; Saw et al., 2016), less is understood about the non-physical factors that could affect subjective wellbeing. Therefore, it would seem prudent to better understand what other

factors might influence wellbeing given that lowered wellbeing has been associated with the negative consequences listed at the start of this introduction.

Some of the non-physical factors potentially influencing subjective wellbeing are match location, the quality of the match opposition, and the match result, collectively referred to as situational match variables (Lago-Penas, 2012). Although not a consistent finding (Brito, 2016; Waters, 2002), there are studies showing that indicators of wellbeing, such as mood, stress and sleep, are influenced by match location (Fothergill, Wolfson, & Neave, 2017; Polman et al., 2007), and match result (Oliveira, Gouveia, & Oliveira, 2009; Polman et al., 2007; Wilson, & Kerr, 1999). This lends some support to the contention that these situational match variables may affect player's perceived wellbeing. However, studies that have investigated the impact of these situational variables in soccer, particularly the impact of the quality of the opposition, are limited.

To the author's knowledge, only one recent study has explored the potential impact of these specific situational variables on subjective wellbeing in a professional soccer setting (Brito, Hertzog & Nassis, 2016). In this study, subjective wellbeing was not affected by match location, the result of the previous match, or the quality of the upcoming opposition. Subjective wellbeing was only assessed a day before the match and, as the authors acknowledged, this might not be the most suitable time to assess the influence of these variables on match-to-match fluctuations in wellbeing. Instead, it could be more relevant to measure their effects in the days following a match, when the players are training for their next match. If, for instance, subjective wellbeing is still affected several days after losing a match, then this could have important ramifications for subsequent training and competition. A greater understanding of how these situational match variables might be affecting player wellbeing could help coaches not only make more informed decisions when prescribing subsequent training load but also help identify if there are certain matches in the season when players might need additional support to cope with the demands (e.g., losing to a top-table team).

No study to date has attempted to measure the influence of these situational match variables on subjective wellbeing (specifically; fatigue, soreness, sleep, stress and mood) in under 23 soccer players after several matches throughout a season. Thus, the primary aim of this study is to examine whether match location, match result and the quality of the opposition influences self-reported wellbeing the day before a match and 1 and 3 days following a match. We hypothesized that self-

reported wellbeing would be negatively affected by these situational variables the day after the match but not before the match.

Materials and Methods

Participants

Eleven under 23 male soccer players took part in this study over the 2016-2017 season (Age, 19.5 ± 1.2 years; height, 1.80 ± 5.20 m; body mass, 76.1 ± 7.5 kg; 7.7 ± 0.9% body fat). Four of the players were defenders, five were midfielders, and two were forwards. The players were from a squad competing in the Premier League 2 competition in England, as part of the new Elite Player Performance Program (EPPP). Data was initially collected for 15 players; however, 4 players data were omitted from the final analysis because they missed more than 50% of the matches (due to loans, international duty, injury or illness) or did not play sufficient minutes in the matches (<45). Ethical approval was granted by the University Ethics Review board. All players provided written informed consent for this study.

Subjective wellbeing was measured with an in-house questionnaire that the players completed 4 – 6 times per week, dependent on the number of training sessions scheduled. The questionnaire had 5 separate aspects of player wellbeing and was developed from the recommendations for identifying overtraining by Hooper and Mackinnion, (1995). These were: 1) how sore do your muscles feel today? 2) How fatigued do you feel today? 3) How well did you sleep last night? 4) How is your mood today? 5) How stressed do you feel today?. Each question was scored using a 1-5 likert scale with 1 representing a low score and 5 a high score. These items have been used extensively to examine self-reported wellbeing and have been shown as sensitive to changes in training load-induced stress (Fessi et al., 2016; Moalla et al., 2016; Watson et al., 2016). The players completed the wellbeing questionnaires before training. The day after home matches, this was ~09:30, but for away matches, on all but 2 occasions this was ~13:00. The later time after away matches was to allow the players extra time to sleep given the travel involved with away matches. At 3 days post-match, all measures were taken at ~09:30 before training. Players had been completing the wellbeing questionnaire since U15 as part of the club's daily readiness to train assessment. Players received regular education regarding the accuracy of values submitted in the questionnaire, with sport scientists utilising the data to prescribe recovery interventions.

Rating of perceived exertion scores (RPE) were collected 30 minutes following the cessation of a match, and multiplied by total duration (in minutes) to provide a marker of internal training load for each match (Foster, 1998). An average of the s-RPE after each match was used for analysis.

Data analysis

For the purpose of this study, self-reported wellbeing scores were taken on the morning before the match (PRE), the day after the match (~12-15 hours after the match; POST-1) and 3 days after the match (~60 hours after match; POST-3). Players data was excluded if they had 1) played less than 45 minutes in the matches; 2) suffered from an injury during the match; 3) not reported their wellbeing at POST-1. This left 17 matches in total; 8 of which were played at home and 9 away; 8 were wins, 7 were losses and 2 ended in a draw. Because of the low number of matches that ended in a draw in the data set, comparisons for the match result variable were only made between matches won or lost. The average number of days between matches was 6; none were less than 3 days apart. Similar to a recent study (Varley et al., 2017), we determined the quality of opposition from the final league position of the opposing team; those who finished in the top 4 were classified as 'top-table', those in the middle 4 'mid-table' and those in the bottom 4 'low-table'. For the 3 cup matches (matches within competitions aside from those in the team's regular league) included in the analysis, the opposition was classified as either high or low depending on whether they were in the league above or below the current team. For the pre-match analysis, the quality of match opposition, and match location variables were analysed with respect to the upcoming match that day whereas the match result variable was analysed with respect to the outcome of the previous match. For the post-match analysis, the quality of opposition, match location, and match result were all analysed with respect to the most recent match.

Statistical analysis

All data were analysed using SPSS version 23 for Windows and significance set as $P < 0.05$ prior to analysis. Data was considered normally distributed upon inspection of histograms and at $P \geq 0.05$ on the Kolmogorov-Smirnov test. A repeated measures analysis of variance (ANOVA) was used to explore interaction effects in the subjective wellbeing variables (fatigue, soreness, sleep quality, stress, mood) and the situational variables (match location, match result, quality of the upcoming opposition) over time (PRE, POST-1, POST-3). Soreness was not normally distributed so was log transformed for data analysis. In the event of a significant interaction effect, *post hoc*

analysis with Bonferroni adjustments were performed to locate where the significant differences occurred. Paired t-tests were used to explore differences in subjective wellbeing and s-RPE for two of the situational variables (match location and match result). A one-way analysis of variance (ANOVA) was performed to evaluate differences in subjective wellbeing and s-RPE for the quality of opposition variable (top-table team, mid-table team, and low-table team). All data are reported as mean ± SD. Cohen's *d* effect sizes (ES) were calculated for paired comparisons with the magnitude of effects considered small (0.2–0.49), medium (0.5–0.79) and large (≥0.8) (Cohen, 1988).

Results

Match loads

Session-RPE is presented as arbitrary units. Player's s-RPE for the 17 matches did not differ, irrespective of match location (home, 695 ± 90 AU vs. away, 636 ± 62 AU; P = 0.095, ES = 0.77), match result (win, 619 ± 118 AU vs. away, 664 ± 54 AU P = 0.227, ES = 0.52) or opposition (top, 617 ± 134 AU vs. mid, 657 ± 117 AU vs. low, 708 ± 81 AU; P = 0.241).

Match location

The results for match location are displayed in Figure 1. There was a time*location interaction effect for fatigue (P = 0.027) with post hoc analysis revealing that fatigue was greater after home vs. away matches at POST-3 (P = 0.014; ES = 0.29). Similarly, there was a time*location effect for soreness (P = 0.001), which was reported as greater at POST-3 after home matches (P = 0.014; ES = 0.49). A time*location effect was also evident for sleep quality (P = 0.001), which was reported as worse after away matches at POST-1 (P = 0.05; ES = 0.34) and POST-3 (P = 0.032; ES = 0.12). Stress was also affected by match location (time*location effect: P = 0.001); stress was higher after an away match at POST-1 (P = 0.001; ES = 0.67) and POST-3 (P = 0.013; ES = 0.29). Mood followed a similar pattern, and was lowered at POST-1 (P = 0.001; ES = 0.77) and POST-3 after an away vs. home match (P = 0.022; ES = 0.24).

Match result

The effect of match result on subjective wellbeing is displayed in Figure 2. Both fatigue and soreness were unaffected by the match result (time*result; P = 0.223 and P = 0.378, respectively).

However, sleep showed interaction effects (P = 0.020) and was reduced at POST-1 (P = 0.011). Stress was also affected by the match result (time*result; P = 0.001) and was greater at POST-1 (P = 0.001) and POST-3 (P = 0.002) after a defeat. Mood followed a similar pattern (time*result; P = 0.001) and was lowered at POST-1 (P = 0.001) and POST-3 (P = 0.004) after a defeat compared to a win.

Quality of opposition

The effects of quality of the upcoming opposition on subjective wellbeing are displayed in Figure 3. Fatigue and soreness were not influenced by the quality of the upcoming opposition (time*opposition; P = 0.644 and P = 0.967, respectively). There was an interaction effect for sleep quality, however (P = 0.005); at POST-1, sleep quality was worse after playing a top team vs. a bottom team (P = 0.033; ES = 0.99). Stress was also affected by opposition quality (time*opposition; P = 0.05). Stress was higher at POST-1 after playing a top team vs. a bottom team (P = 0.014; ES = 1.14) and a middle team vs. a bottom team (P = 0.002; ES = 1.67). Similarly, at POST-1, mood was lower after playing a middle team vs. a bottom team (P = 0.24; ES = 1.69).

Discussion

The main findings of the present study are, that irrespective of the physical demands of the matches (as measured by s-RPE), match location, match result, and the quality of the opposition significantly affected subjective wellbeing after soccer matches. Of the five variables measured, sleep quality, stress, and mood were the most affected by these situational variables. Furthermore, match result and match location had the biggest influence on subjective wellbeing, as evidenced by several variables still negatively affected 3 days after the match. This study provides new information on the potential influence that these specific situational match variables have on subjective wellbeing in soccer players.

On the morning before a match, the match location, result of the previous match and the quality of the upcoming opposition did not influence subjective wellbeing. These findings are in agreement with those of Brito et al., (2016) who reported a questionnaire measuring subjective levels of fatigue (and that contained questions relating to soreness, sleep and stress) was not influenced by these situational variables when assessed the day before a match. Others have also reported no differences in mood or stress prior to home vs. away matches (Fowler, Duffield, & Vaile, 2014;

Polman et al., 2007); however, to the best of our knowledge, no other studies have examined the impact of previous match result or the quality of the upcoming opposition on subjective wellbeing. Our findings, alongside those of Brito et al. (2016), suggest that prior to a match, these situational variables do not influence soccer player's perceived wellbeing and, thus, are unlikely to affect subsequent performance.

The day after a match, sleep quality and mood were lower and stress higher if the match was played away vs. home. These effects are more likely to be due to the psychological or environmental factors as opposed to the physical demands of the matches, given that s-RPE was similar for home and away matches. Our findings are actually in contrast to a previous study that measured the effects of match location on subjective wellbeing. In Fowler et al. (2014), air travel had minimal influence on perceived fatigue, soreness, sleep quality, and stress in 6 elite Australian soccer players 1 and 2 days after an away match. Notably, they found soreness and stress tended to be greater after home than away matches; we also observed this for soreness at POST-3, although we are unclear why this might have occurred. Match load did tend to be greater after home matches (ES = 0.77) so the increased soreness was perhaps due to the slightly higher physical demands reported after home matches. There are a number of possible explanations for the discrepant findings between those of Fowler et al. (2014) and the present study, including the different timings that the measures were taken (2 days before and 2 days after in Fowler et al., 2014) the different methods used to evaluate subjective wellbeing (theirs was scored between 1 - 7 not 1 – 5 as in the present study), the technical and tactical performance during the matches, and the fact the players were from an elite professional squad in Australia and not an under 23 squad in the UK.

Some of the non-performance related factors that could have affected mood and stress in the away matches include travel, unfamiliarity with surroundings, habit disruption, changes in food provision, pressure from away supporters, and sleep loss (Waters & Lovell, 2002). In qualitative interviews, travel and sleep loss were actually identified as being the two key reasons why soccer players preferred playing at home (Walters & Lovell, 2003). In line with this, sleep quality was significantly lower in the present study after away matches. It would be reasonable to assume that this contributed to the player's reduction in mood and increase in stress over the same period. The main reason why sleep quality was reduced after away matches is probably due to the fact that the players went to sleep later, as the matches were all played at night (19:00 kick off) and they had

to travel a further distance to get home. This chronobiological disruption alone could be enough to affect perceived sleep quality (Nedelec, Halson, Abaidia, Ahmaidi, & Dupont, 2015). It could be argued if the matches were played during the day then sleep quality would not have been affected by match location, as recently reported (Fullagar et al., 2016). However, unlike the present study, Fullagar and colleagues (2016) found no differences in sleep quality after home vs. away matches that were played at a similar time to those in the present study (≥18:00). The reason for this discrepancy is not clear, but it could be related to when the questionnaire was administered (pre-training in the present study vs. immediately waking), or simply due to differences in when the players went to sleep or when the players woke up the following morning. Regardless of the precise reason, the present study's findings suggests more emphasis needs to be placed on improving sleep quality to ensure teams playing at night are adequately rested and recovered for subsequent training and competition. These results could be particularly pertinent for the Category 1 teams currently competing in the Premier League Division 1 and 2 Under 23 leagues in England as due to competition rules all matches are played at night.

Subjective wellbeing was significantly lower after losing a match vs. winning a match; specifically, stress was increased while mood and sleep quality were reduced after a loss. It is perhaps not surprising that losing a match negatively affects wellbeing in the immediate hours or the day following a match, and this has been observed before in both rugby players (Polman et al., 2007; Kerr & Schaik, 1995) and female soccer players (Oliveira et al., 2009). The novel finding in this study is that mood and stress were still negatively affected 3 days after suffering a defeat, suggesting the disappointment of losing a match persists for several days. Such changes could have important ramifications for subsequent training prescription in the weeks after losing a match, given that lowered mood has been associated with several deleterious effects, including impaired recovery and performance (Nedelec et al., 2015), poor decision-making (Polman et al., 2007) and increased injury risk (Galambos et al., 2005; Watson et al., 2016). Therefore, coaches and sports scientists need to be cognizant that players might need better coping strategies after losing matches, as well as an increased emphasis on sleep hygiene practices to minimise the potential for deleterious psychobiological effects.

Previous studies have shown that the quality of the opposition can affect physical performance during a soccer match (Lago, Casais, Dominguez & Sampaio, 2010), and training loads in the 3

days following a match (Brito et al., 2016); however, to the author's knowledge, this is the first study to demonstrate that it can also affect subjective wellbeing in the days after a match. Indeed, 1-day post match, fatigue and stress were higher and sleep quality was lower after playing a top-table team, and mood was lower after playing a mid-table team. Unlike with location and result, subjective wellbeing was not affected at 3 days post-match, suggesting that the quality of opposition might have less of an impact than these two variables on subjective wellbeing. It is not entirely clear as to why playing a top team would affect subjective wellbeing the day after a match. It is unlikely to be due to match result as in the 7 matches played against a top-table team, a similar number were lost vs. won (4 vs. 3, respectively). Also, s-RPE was not different between the matches, so differences in the physical demands is not able to explain these findings. With that said, GPS data was not available so we were unable to determine if there were any differences in speed thresholds between these matches. We acknowledge that this is a limitation of the study. It has been shown that the quality of opposition effects running speed during a soccer match (Lago et al., 2010; Liu, Gómez, Gonçalves & Sampaio, 2016), so it is possible that differences in running speed or explosive actions could have contributed to these findings. In addition, technical and tactical performance have also been shown to be influenced by the quality of the opposition (Liu et al., 2016; Varley et al., 2017) and this might also influence subjective wellbeing. Although information on the effects of technical and tactical changes on subjective wellbeing have not been established, intuitively, the technical and tactical demands of playing against a top opposition would be greater and this could impose a higher mental stress on the players. This could be, at least in part, because of the greater challenge/threat posed by the opposition or increased importance of the match (Arruda, 2017). In turn, this might elicit changes in stress quality, sleep and mood substantial enough to persist for several hours after the match. In partial support for this idea, matches perceived as being more difficult or of greater importance have been shown to provoke greater increases in cortisol (Arruda, Aoki, Paludo & Moreira, 2017; Moreira et al., 2014), a hormone secreted by the adrenal gland in response to stress, and has been shown to affect mood and sleep (Leproult, Copinschi, Buxton, & Van Cauter, 1997; van Eck, Berkhof, Nicolson, & Sulon, 1996). However, this is a speculative explanation and further research investigating why the quality of opposition might affect post-match subjective wellbeing is required.

There are several limitations to this study that need to be acknowledged. Firstly, it is not clear how meaningful the observed changes in wellbeing are, because, as recommended by Saw et al., (2017)

we were unable to collect a series of baseline scores to assess the typical day-to-day variation for each player, irrespective of training load. It is important that these be factored into future research. Secondly, our data set was relatively small (11 players across 17 matches) and, therefore, we may have been underpowered to detect more subtle changes in wellbeing by these situational variables. Indeed, a power analysis revealed that to detect a significant difference (α of 0.05) in sleep quality at POST-3 (using the data observed) we would need 56 players at 80% power. Of course, such analysis was not possible in the present study due to the squad size and thus multiple squads would be required. Also, along with low participant numbers, the low number of matches was the main reason for not assessing interactions between the different variables with more sophisticated statistical techniques such as regressions equations (e.g., losing an away match against a top team). We felt this analysis would be more impactful with a larger data set. Our analysis did include significantly more matches than several other similarly designed studies (Fowler et al., 2014; Polman et al., 2007). Future studies should look to include larger numbers and we must stress these findings are far from definitive but rather exploratory. In addition, because the participants were playing in the Under 23 Premier League 2 Division, our findings might not be generalizable to other soccer populations, e.g., senior teams competing in the highest competitions. However, these findings clearly have high relevance to those teams who currently play under the EPPP in England. Finally, it is important to acknowledge that there are several other variables that could have affected subjective wellbeing other than the situational match variables examined in this study. Most notably, tactical and technical performance, the environment—and non-match related events such as peer group or general life stressors—and it is important that these are kept in mind when interpreting these findings.

Conclusion

In conclusion, this study provides the first evidence that the quality of opposition, and especially the match location and match result, might negatively influence the subjective wellbeing of Under 23 soccer players for several days after matches. From a practical perspective, these findings highlight that practitioners working in soccer, especially those working with under 23 teams in England, might need to factor in the potential influence of these specific situational match variables when prescribing training load between matches. The data also suggests that players might need

additional psychological support (e.g., effective coping strategies) after fixtures that might be affected by these specific variables.

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Figure 1 – The effects of match location on subjective wellbeing the day before a match (PRE) to 1 day after the match (POST-1) and 3 days after a match (POST-3). Boxplots show mean ± SD and minimum to maximum values. Transparent plots represent home matches, grey plots represent away matches. AU = arbitrary units; scored between 1 and 5. *represents significant difference between home vs. away at the three different time points.

Figure 2 – The effects of match result on subjective wellbeing the day before a match (PRE) to 1 day after the match (POST-1) and 3 days after a match (POST-3). Boxplots show mean ± SD and minimum to maximum values. Transparent plots represent a win matches, grey plots represent a loss. AU = arbitrary units; scored between 1 and 5. *represents significant difference between win vs. loss at the three different time points.

Figure 3 – The effects of the quality of the opposition on subjective wellbeing the day before a match (PRE) to 1 day after the match (POST-1) and 3 days after a match (POST-3). Boxplots show mean ± SD and minimum to maximum values. Transparent plots represent top-table teams, grey plots represent mid-tables teams and black plots represent bottom table teams. AU = arbitrary units; scored between 1 and 5. *represents significant difference between top-table vs. bottom table team at the three different time points. #represents significant difference between mid-table team vs. bottom table team at the three different time points.