Return to competitive gymnastics training in the UK following the first COVID-19 national lockdown

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Abstract

Following the outbreak of COVID-19 (coronavirus), the UK entered a national lockdown, and all sport was suspended. The study aimed to explore the process of returning to gymnastics training after several months away from the gym, with particular interest towards training load and injury. Twenty-six, national programmed gymnasts from Men’s artistic, Women’s artistic and Trampoline gymnastics recorded training load and injury whilst returning to training. At the end of data collection, 3 coaches were interviewed to further explore the experiences and practices of returning to training. Home-based training during lockdown was seen as beneficial in maintaining a level of fitness. Coaches described a gradual increase in training to reduce the risk of injury and this partly explains a non-significant association between training load and a substantial injury ($P=0.441$). However, week-to-week changes in training load following periods of additional restrictions (additional lockdown, periods of isolation or substantial restrictions), were not always gradual. There was a significant association between an injury in the preceding week (niggle or substantial injury to a different body part) and a substantial injury in the subsequent week (RR: 5.29, $P=0.011$). Monitoring training was described to be a useful practice during the process of returning to training. Coaches believed that although the short-term development of their gymnasts were affected, the long-term development would not be impacted from COVID-19. It is anticipated that learnings from this study can be applied to future practices and situations, particularly when gymnasts are away from the gym for an extended period.

Keywords: COVID-19, Gymnastics, Trampoline, Return to Training, Training Load, Injury, Niggles
Introduction

In March 2020, following the outbreak of COVID-19 (coronavirus), the UK entered its first national lockdown as an attempt to reduce the spread of the virus. As a result, all organised sport was suspended and during this time young gymnasts, like many other athletes, were restricted to home-based exercise and training. Following the easing of restrictions, gymnasts in England, gradually followed by gymnasts in Northern Ireland, Wales and Scotland, were able to return to training within a gym environment.

One particular concern of returning to sport-specific training following lockdown is the increased risk for injury. During the lockdown period, it was assumed athletes would experience a certain amount of detraining as a result of a reduction in training loads and sport-specific stimuli. Consequently, these changes in training may influence tissue structures and mechanical properties resulting in an increased risk of injury if not considered or appropriately addressed when returning to sport-specific training. From a training load perspective, previous research has associated sudden increases or ‘spikes’ in training load with an increased risk of sustaining an injury. To avoid sudden increases in training load whilst returning to training following national lockdown, it was recommended by researchers and practitioners in professional and amateur sports contexts that training should be increased gradually to minimise the risk of injury. Recent research has also suggested that athletes experiencing minor injuries or ‘niggles’ may be at an increased risk of injury in the following week. As it is likely athletes will experience niggles when returning to training, flagging niggles may act as a tool for reducing the risk of more substantial injuries. Reducing the risk of injury in competitive, young gymnasts as they return to gym-based training was also important to minimise any further disruption to their development.

Typically, gymnasts train in the gym all year round for multiple hours each week, with minimal time spent out of the gym. The national lockdown has created a unique opportunity to explore the process of returning to gym-based training after several months away. Findings from this study may provide future guidance for returning to gym-based training following an extended period away from the gym (e.g., due to injury or illness). The primary aim of the study was to explore how competitive, young gymnasts returned to training in gyms following the UK’s initial COVID-19 national lockdown, with particular interest towards training load and injury. The second aim of the study was to understand the perceptions and experiences of coaches during this time.

Materials and Methods
A mixed-method design was used to develop a complete understanding of returning to gymnastics training. Training load and injury were recorded between the 25th July and the 13th December 2020. At the end of data collection, three coaches were interviewed to further explore the experiences and practices of returning to training.

Gymnasts from Women's artistic (WAG), Men's artistic (MAG) and Trampoline (TRA) Great Britain Pathway Programmes were invited via email to take part in the study. Following data collection, a purposive sample of three coaches (Table 1) who's gymnast(s) had participated in the study, were invited via email to participate in individual interviews. Consent and assent were provided via an online survey by parents and gymnasts, respectively. Consent was also obtained from the interviewed coaches. The study was approved by the University of Bath Research Ethics Approval Committee for Health.

***Insert Table 1 near here***

Data collection for each gymnast began in line with their club reopening. Each gymnast received a training capture form via email and was asked to complete the form for each training session following their return to the gym. Gymnasts were asked to record separate duration (min) and rate of perceived exertion (RPE [0-10]) scores for each apparatus or activity to account for the long duration of training sessions (3-4 hours) and variance in demands of each apparatus/activity. An RPE scale with verbal anchors was provided for each gymnast. Trampoline gymnasts were also asked to record the total difficulty of skills for each trampoline session as requested by National Trampoline Coaches.

Gymnasts were instructed to report details of any pain or injury (i.e., location) for each apparatus/activity. Additionally, gymnasts reporting any pain or injury were requested to complete the updated Oslo Sports Trauma Research Center Questionnaire on Health Problems (OSTRC-H2) at the end of each week. Injury was defined in this study as any physical complaint reported by the gymnast using the OSTRC-H2 questionnaire as a consequence of rapid or repetitive transfer of kinetic energy. An injury was defined as substantial if it resulted in moderate or severe reductions in sports performance or training, or time loss. An injury was described as a 'niggle' if it did not result in moderate or severe reductions in sports performance or training, or time loss. Blisters, skin tears, illness and any medical conditions were excluded from the study.
Three interviews took place between the 18th and 21st December 2020 using an online video platform. Audio was recorded using a sound recording application. A pilot interview was completed prior with a National Coach. Only the principal investigator (interviewer) and individual coach were present during the interview. Similar to the protocols employed by Cumming, Brown, Mitchell, Bunce, Hunt, Hedges, Crane, Gross, Scott, Franklin 18 and Patel, McGregor, Fawcett, Bekker, Williams, Williams, Cumming 19, both written and verbal methods were used in the interviews. At the start of the interview, the coach was instructed to ‘write three words to describe what coaching gymnastics has been like since returning to the gym from lockdown one’. The coach was then asked to elaborate on each word, where conversation from the activity led into the main interview. The interview itself was semi-structured in design to allow flexible questioning and was based on experience, practice, performance and injury since returning to a gym environment following the first national lockdown (Appendix 1). Additional field notes were made only to guide the flow of the interview.

Descriptive statistics were calculated for gymnasts, training load and injury. Only gymnasts completing a minimum of 10 weeks of data were analysed. The final week of data was omitted for each gymnast if a full week was not recorded. Training load data was shortened if a substantial period of duration or RPE data were missing (15 weeks omitted). Session-RPE (sRPE) [duration x RPE] was calculated for all training sessions. Missing RPE data (1% of 7916 reported training sessions/activity), was estimated from RPE of similar and recent training sessions. Training load was analysed as week-to-week changes in total weekly load, expressed as a percentage value.

The OSTRC-H2 questionnaire was used to calculate the prevalence and severity of an injury for each week. Missing OSTRC-H2 questionnaires (10% of 130 the questionnaires used in the study) were estimated from details of reported pain or injury. OSTRC-H2 questionnaires with inconsistent answers (24% of 130 questionnaires used in this study) were corrected in accordance with details of reported pain or injury (e.g., if an athlete selected ‘full participation without health problems’ but also selected symptoms as ‘to a mild extent’ or if the questionnaire reflected the day of the injury rather than the week). Prevalence of injury was calculated for each week by dividing the number of gymnasts reporting an injury using the OSTRC-H2 questionnaire by the total number of gymnasts who completed a training capture form for that week of training. The same calculation was applied to calculate the prevalence of a substantial injuries.

Descriptive statistics and statistical tests were performed using R Studio (version 3.3.6, The R Foundation for Statistical Computing Platform, Vienna, Austria), using the ‘lme4’ package for modelling
training load and injury. To remove potential skewing of results, outlier week-to-week changes were omitted if greater than 3 SD away from the mean. Week-to-week change values were offset by one week, such that a given week-to-week change value was associated with injury risk in the subsequent week (due to the impact that an injury in a given week would have on the loads undertaken that week).

Generalised linear mixed-effects models were used to model the associations between week-to-week changes in training load and a substantial injury and, the association between preceding injury (niggle or substantial injury to a different body part) and a substantial injury in the subsequent week using a binomial distribution and complementary log-log link function. Week-to-week changes and were modelled as a numeric fixed effect and gymnast ID was modelled as a random effect.

Interviews ranged between 23 and 64 minutes (average = 38 min). Interview audios were manually transcribed verbatim for analysis. All identifiable names were anonymised and replaced with pseudonyms. Transcribed interviews were analysed manually by the principal investigator in Microsoft Excel. Interviews were analysed using thematic analysis based on the method described by Braun, Clarke. Coaches were given the opportunity to clarify initial interpretations and include additional comments if required to enhance the trustworthiness of interpreted data.

**Results**

Twenty-six (11 male; 15 female; age 11.9 ± 1.7 years) gymnasts (Table 2) recorded training load and injury as they returned to training in the gym. No gymnasts tested positively for COVID-19. An additional 19 (10 male; 9 female) gymnasts were excluded from analysis. Of these 19 gymnasts, 17 gymnasts recorded less than 10 weeks of data or provided inconsistent data, 1 gymnast formally withdrew from the study and 1 gymnast retired from gymnastics.

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An average of 16.3 ± 3.8 (± SD) weeks of training load and injury data were analysed for each gymnast. Weekly changes in training load varied between each week and each gymnast (Figure 1). Overall, the average change of weekly training load throughout the data collection period (weeks 2 to 20) was 18.7% ± 26.8% (± SD). During the data collection period, a total of 430 (average ± SD; 15.9 ± 15.7 per gymnast) days were recorded in an additional lockdown, isolation or when a gymnast had substantially restricted access to the gym (less than half of weekly sessions). Weekly changes in training load following additional lockdown, isolation or substantial restriction differed between gymnasts (Figure 1). On
average, weekly training load changed by $109.8\% \pm 140.7\%$ (± SD) following an aforementioned restriction.

***Insert Figure 1 near here***

The average weekly prevalence of an injury and the average weekly prevalence of a substantial injury was 28% (95% CI 23 to 34) and 11% (95% CI 8 to 13), respectively. The prevalence of a substantial injury was highest in week 3 (Figure 2) The most commonly described area for an injury to occur (weekly prevalence through the OSTRC-H2 questionnaires) was the lower extremities (59.1% [knee (20.1%), ankle/foot (19.5%), shin (7.9%), heel (6.7%), calf (1.8%), groin (1.2%), hamstring (1.2%), hip flexor (0.6%)], followed by the elbow (11.6%), shoulder (11.0%), wrist (6.7%) and chest/rib (6.1%). Other injury locations included back (3.0%), neck (1.2%), arm (0.6%) and thumb (0.6%). Discipline specific averages of training load and injury characteristics can be found in Appendix 2.

***Insert Figure 2 near here***

There was no significant association between week-to-week changes in training load and the risk of a substantial injury in the subsequent week ($P=0.441$) (Figure 3). However, there was a significant association between a preceding injury (niggle or substantial injury to a different body part) and a substantial injury (RR: 5.29, $P=0.011$) (Figure 4).

***Insert Figure 3 & 4 near here***

Six core themes and three sub-themes were identified through inductive thematic analysis using the interview guide as guidance. Definitions of the core themes can be found in Table 3 and supporting quotes can be found in Appendix 3.

***Insert Table 3 near here***

**Lockdown**

Home training during lockdown was discussed by all three coaches. This included individual training and group sessions on zoom. All three coaches expressed the benefits of training during lockdown from both a physical and mental perspective. In particular, coaches highlighted the positive impact that home training had on their gymnasts when they returned to training in the gym. Additionally, the MAG
coach articulated the benefit of lockdown itself on his older gymnast in terms of rest and recovery. Specifically, this gymnast was deemed to be in a period of rapid growth prior to lockdown.

Challenges of returning to training in the gym

Several challenges were articulated by coaches when they were able to return to training in a gym environment. One of the common challenges was knowing how quick to progress training alongside managing the speed of which the gymnast wanted to progress. Both the WAG and TRA coach also highlighted the growth of some gymnasts as a challenge when returning to training in the gym. Other challenges included gymnasts coming back at different abilities both physically and mentally, and challenges faced with unknown time frames, particularly regarding competitions getting cancelled.

Rules & Restrictions

Rules and restrictions were a specific challenge faced by all three coaches as they returned to training in the gym. These included late and/or limited access to training venues, the banned use of foam pits and inability to support gymnasts from both a safety and confidence point of view. These rules & restrictions became a challenge when planning a safe return to gymnastics training.

Return to training – Practice

All three coaches described their return to training process as gradual, taking onboard the advice given from National Governing Bodies and experts in the field. Across the board, coaches started with basics and/or conditioning for the first few weeks before building up skills. In particular, the TRA coach emphasised breaking down skills further than normal. Although training was gradual, the MAG coach did add ‘if the gymnast said can I try this, I feel good, I would let them if they felt they were ready to do go further, quicker than my plan erm because in my mind I’ve never been through this before and I was maybe too cautious and maybe holding back a bit too much.’.

Monitoring training load

During the data collection period, coaches were asked to monitor internal training load using sRPE. All three coaches commented on the benefit of using RPE and how it was used to influence training. This included stimulating conversation with their gymnasts and modifying training. Additionally, the WAG coach discussed monitoring elements of external load such as ‘vault impacts so every time they hit the vault and that went up by 15% each week. Long swing actions on bars. On floor it was landing hard landings and onto soft they could do more but we strict on how many hard landings they did and impacts on the beam.’ The WAG coach also collected wellness measurements at the start of each training
session and an RPE at the end. None of these variables of load were previously monitored prior to lockdown. All three coaches expressed that they would like to continue monitoring internal training load variables in the future.

**Full training**

The time period to return to full training (volume and ability) differed between coaches. The WAG coach suggested her gymnasts were at a similar ability of gymnastics before the second lockdown (~15 weeks) but was not able to reach the same volume (in reps per session) on all the pieces before the second lockdown. The MAG coach described his gymnasts to reach full training volume (in hours) to be between 6-8 weeks and 12 weeks to return to a similar ability prior to lockdown. The TRA coach described his gymnast to return to a similar amount of volume (measured in contacts) and ability within 9-10 weeks.

**Niggles and injuries**

All three coaches described their gymnasts to experience niggles with only one WAG gymnast experiencing both an ongoing and acute injury, whilst returning to training in the gym. Coaches expressed their caution towards niggles and injuries when returning to training in the gym and explained the purpose for increasing training gradually was a means of reducing the risk of any injuries. This gradual approach was reflected on by the TRA coach when his gymnast experienced niggles following a sudden increase in training.

**Additional lockdowns or isolation**

The experience of additional lockdowns or isolation during the data collection period varied between all three coaches. This was attributed to the differing motivational levels of individual gymnasts, whether their gymnasts had to isolate and the home nation of the club. The WAG coach interviewed in this study was based in England. Although none of her gymnasts had to isolate, England went into a second, 4-week lockdown. Motivational levels during and following the second lockdown differed between gymnasts.

The MAG coach interviewed in this study was based in Wales and during the data collection period experienced local lockdowns and a 2-week lockdown (‘circuit breaker’). In addition, some of his gymnasts had to isolate. Overall, motivation was perceived as constant but the varying level of gymnastics between individuals became challenging. The coach described a continuation of home
training during any lockdown or isolation and would then spend ‘probably at least a week of building
back up’ when returning to a gym environment.

Conversely, the TRA coach interviewed in this study was based in Scotland, which did not implement
any additional lockdowns during the data collection period. The gymnast also did not have to isolate
during this time. The coach described his gymnast as ‘very self-motivated in himself’ and believed that
his gymnast would be able to cope in the future if he was no longer able to train through Scottish and
Great Britain elite athlete exemption.

Influence on development
Similar views were shared by all three coaches regarding the influence of lockdowns on their gymnasts’
short and long-term development. Coaches explained that although lockdowns had influenced the
gymnasts short term development, overall, their gymnast’s long-term development (i.e., development
to becoming an elite gymnast) would not be affected.

Discussion
The overall aim of this study was to observe and explore how competitive, young gymnasts returned to
training in the gym following the UK’s first national lockdown in light of the COVID-19 pandemic.
Training at home during lockdown was seen as particularly beneficial on maintaining a level of fitness
and proving advantageous when returning to training in the gym. Home training included, but was not
limited to, strength and conditioning, flexibility, plyometrics, high intensity interval training (HIIT), and
cardiovascular exercises (cycling, running). Artistic gymnasts also incorporated ballet and gymnastics
specific conditioning (e.g. handstands, shaping etc) into their training during lockdown. The benefits of
home training is aligned with previous research, where HIIT has been found to help maintain fitness
during an offseason. Lockdown was also described by one coach as a period of rest and recovery
for a gymnast experiencing rapid growth prior to lockdown. Typically, gymnastics training is comprised
of year long, intense training, however, additional periods of rest or less intense training could benefit
gymnasts experiencing periods of rapid growth. During the growth spurt, youth athletes are found to
be at a greater risk of injury and often experience awkwardness during this time. In comparison,
coaches found gymnasts who had experienced rapid growth throughout lockdown as a challenge when
returning to the gym. Gymnastics coaches have previously described a temporary loss of skill associated
with periods of rapid growth as challenging. In addition, the rules and restrictions imposed to
maintain a COVID secure environment was expressed as challenging whilst returning to gymnastics in
the gym. Restrictions included late and or limited access to facilities, banned use of foam pits and the inability to support gymnasts.

In general, coaches started with basics and conditioning before building up skills, it is, however, unclear as to whether coaches assessed their gymnasts at the start and during the return to training. Assessing the returning levels of fitness (i.e. flexibility, strength etc) provides a baseline for coaches, which therefore will aid the return to training process. A similar battery of testing is often conducted following an offseason to understand an athlete’s current level of fitness\textsuperscript{27}. The observed week-to-week changes in training load was found to vary amongst gymnasts. Previous research has found inconsistencies between coaches and athletes’ perception of training load in other youth sports\textsuperscript{28,29}. Similarly, the discrepancies between perceived gradual increases in training load and actual training load could be partly due to differences in prescribed external load and the observed internal load of gymnasts (sRPE) collected in this study\textsuperscript{30}. Internal load was collected as it represents the individual response to external load and determines training outcome\textsuperscript{30,31}. Coaches interviewed in the study did articulate the benefits of using RPE to monitor and manage training, alongside other variables of training load. Prior to this study, RPE was not commonly used to monitor training load. It was, however, something that these coaches would consider using as a tool to help manage training in the future, along with other methods of monitoring training. Currently, the understanding and process of monitoring training load in gymnastics varies between disciplines (MAG, WAG & TRA)\textsuperscript{19}, therefore further research and coach education is required in this area.

The location of injuries was reported most commonly in the lower extremities, which is similar to previous research in youth gymnastics\textsuperscript{32,33}, however, in this study, injuries were most prevalent in the knee. This differs from preceding literature, where injuries are most frequently reported to occur in the ankle\textsuperscript{32,33}. The prevalence of a substantial injury appeared to be highest during the first few weeks of returning to training in the gym, with the highest prevalence of injury on week 3. This finding was similar to the high incidence of Achilles tendon ruptures immediately following the National Football League lockout\textsuperscript{34}. The return to training process was described as gradual but proved challenging on knowing how quick to progress and managing gymnasts’ expectations of progression. On reflection, one coach believed they were over cautious on the progression and perhaps could have progressed slightly faster. Increasing training gradually was emphasised as a means of reducing the risk of injury. This could partly account for no significant association between week-to-week changes and the risk of a substantial injury amongst gymnasts. In comparison, large increases in absolute week-to-week changes in load have also been found to increase the risk of injury in professional rugby players and adolescent Gaelic
A similar concept was reflected on by one coach, where the gymnast experienced niggles following a sudden increase in training load and was therefore something they would have avoided in hindsight. The differences in findings may also be related to the small number of substantial injuries recorded in this data collection, at least 20 to 50 injury cases are required to detect a moderate to strong associations. Coaches from all disciplines did experience niggles amongst their gymnasts. Some of these niggles may be a result of gymnasts experiencing rapid growth. Interestingly, there was a significant association between an injury in the preceding week (niggle or substantial injury of a different body part) and a substantial injury. From an applied perspective, taking into consideration any injury (including niggles) whilst training may reduce the risk of a more substantial injury developing in the following week. Research in this area is limited and requires further exploration.

Additional lockdown, periods of isolation or substantial restrictions to the gym varied between gymnasts. Variations in these additional restrictions were a result of location, elite athlete exception (where athletes at a certain level have been given permission to continue training), facility access and self-isolation. Although one coach explained how he spent at least a week building training back up following an aforementioned restriction, the observed week-to-week changes in training load were varied. A possible explanation for this variation may be the ability of gymnasts to maintain similar modes and load when training during these restrictions compared to gym training. In addition, following restrictions or anticipated restrictions, coaches also articulated differing motivational levels of their gymnasts.

Gymnasts were described as returning to their pre-lockdown abilities within approximately 9-15 weeks. The variation in time is likely to be due to additional restrictions, individual isolations as well as individual variations. Coaches shared similar views on the impact of COVID-19 on their gymnast’s long and short-term development. Although their gymnast’s short-term development had been affected by COVID-19, overall coaches believed that their gymnast’s long-term development of becoming an elite level gymnast would not be affected.

Due to the nature of the study, only a small number of high-level, pathway gymnasts training load and injury data was captured, therefore interpretations should be taken with caution. Similarly, only three coaches were interviewed and therefore experiences, and opinions may not be representative of all gymnastics coaches. Nevertheless, the mixed methods employed in this study provides a well-rounded appraisal of returning to training in the gym. In addition, there are a few limitations in relation to data collection. As the capture forms were self-reported by gymnasts (with coach or parent assistance), it is
unknown whether any training session or activities were not reported, whether gymnasts took part in
other sports or physical activities outside of gymnastics and at what time point the training load forms
were completed in respect to training. With regards to the Oslo Sports Trauma Research Center
Questionnaire on Health Problems, the understanding and interpretation of the forms may have
influenced the finding in this study. In terms of RPE collection, there is limited and mixed research
regarding the use of RPE in youth athletes and therefore should be considered when interpreting
results. In addition, to overcome the long duration and different demands of gymnastics training, it
was recommended that gymnasts provided a separate RPE rating for each activity. However, it is
unclear whether sRPE captured in this way or in general is a valid method of collecting training load in
gymnastics.

Conclusion

This study aimed to observe and explore competitive, young gymnasts returning to the gym following
the first national lockdown in the UK. Training during lockdown was seen as beneficial in maintaining a
level of fitness. Additionally, lockdown was also perceived as a possible time for rest and recovery.
Coaches interviewed in this study experienced some challenges whilst returning to the gym including
rules and restrictions to maintain a COVID secure environment. Coaches described a gradual increase
in training to reduce the risk of injury and this could partly explain a non-significant association between
week-to-week changes and the risk of injury. Additionally, there was a significant association between
a substantial injury and an injury (niggle or substantial injury of a different body part) in the preceding
week. Monitoring training load was seen as useful throughout the return to training process. At the
time of interview, coaches believed that these gymnasts’ long-term development would not be
impacted from COVID-19.

Perspectives

Learnings from this study can be applied to future situations, particularly when young, competitive
gymnasts are away from the gym for an extended period of time. It is also likely that a number of these
learnings could be applied to other high-performance, youth athletes who are unable to access facilities
for a prolonged period of time. Young athletes should be encouraged to continue training from home
(where applicable) during periods where the gym cannot be accessed, to help maintain a level of fitness.
This could include strength, sport-specific conditioning, and cardiovascular training such as HIIT. It is
still recommended that any return to training is gradual, avoiding any large changes in week-to-week
load, to reduce the risk of injury. Moreover, coaches should be encouraged to monitor internal loads
(e.g., RPE), alongside external measures of training load, to help guide and manage the return to training process. In general, injuries, including niggles, should also be taken into consideration to reduce the risk of a more substantial injury developing. For instance, training load modifications and/or prehabilitation exercises could be used to prevent ‘niggles’ developing into substantial time-loss injuries. This study also raises the question as to whether youth gymnastics training is required to be intense all year round, particularly for gymnast’s experiencing growth spurts. From a development point of few, reduced periods of training and scheduled periods of recovery may contribute to gymnast’s longevity.
Acknowledgements

The authors would like to thank the gymnasts, parents and coaches for their contribution and efforts throughout this study.

Funding details: This work was supported by British Gymnastics and University of Bath.

Disclosure statement: The following authors, Alex McGregor and Karen Williams are employees of British Gymnastics. Author Tejal Sarika Patel is a contracted employee and partly supported by British Gymnastics.

Data availability: Due to the nature of this research supporting data is not available.
References


## Tables

**Table 1: Coach characteristics**

<table>
<thead>
<tr>
<th>Coach</th>
<th>Gender</th>
<th>Discipline</th>
<th>Qualification</th>
<th>Gymnast Programme</th>
<th>Home Nation</th>
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<tr>
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<td>Female</td>
<td>WAG</td>
<td>Level 5</td>
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<td>England</td>
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<td>Level 3</td>
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### Table 2 Gymnast characteristics

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<th>Programme</th>
<th>Home Nation</th>
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<td>9 - 12</td>
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<td>England (n=7)</td>
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<td></td>
<td>10.5 ± 1.1</td>
<td>Development (n=1)</td>
<td>Wales (n=2)</td>
</tr>
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<td>MAG (n=5)</td>
<td>10 - 14</td>
<td>Foundation (n=3)</td>
<td>England (n=4)</td>
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<td></td>
<td>11.8 ± 1.5</td>
<td>Development (n=2)</td>
<td>Wales (n=1)</td>
</tr>
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<td>TRA (Male=6; Female=6)</td>
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<td>Foundation (n=2)</td>
<td>England (n=10)</td>
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<td></td>
<td>12.8 ± 1.5</td>
<td>Development (n=7)</td>
<td>Scotland (n=2)</td>
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<tr>
<td></td>
<td></td>
<td>Junior (n=3)</td>
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</tr>
</tbody>
</table>

WAG – Women’s artistic gymnastics; MAG – Men’s artistic gymnastics; TRA – Trampoline gymnastics. Age: Min-Max; Mean ± SD (Age at start of individual data collection). Programme: GBR performance pathway programme as of March 2020.
Table 3 Definitions of core themes

<table>
<thead>
<tr>
<th>Theme</th>
<th>Definition</th>
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<tr>
<td>Lockdown Experience and practice during the first initial lockdown</td>
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<tr>
<td>Challenges of returning to training in the gym</td>
<td>Challenges faced by coaches and gymnasts when returning to training in a gym environment</td>
</tr>
<tr>
<td>Return to training – Practice</td>
<td>The practice of returning to full training in a gym environment</td>
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<tr>
<td>SUB THEMES: Rules &amp; restrictions</td>
<td>Niggles and injuries experienced whilst returning to training in a gym</td>
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<tr>
<td>Niggles and injuries</td>
<td>The influence and experience of additional lockdowns or isolation</td>
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<td>Additional lockdowns or isolation</td>
<td>Coaches perspective on gymnastics short and long-term development</td>
</tr>
<tr>
<td>Influence on development</td>
<td></td>
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</table>
Figure 1. Individual gymnast’s weekly training load (sRPE). Blue bars represent training during additional lockdown, isolation or when a gymnast had substantially restricted access to the gym (less than half of weekly sessions).
Figure 2. Weekly prevalence of a substantial injury. Prevalence ± SE
Figure 3. Interaction between week-to-week changes in training load and the estimated risk of a substantial injury. Shaded areas represent 95% CI.
Figure 4. Interaction between any physical complaint in the preceding week and the estimated risk of a substantial injury. Estimated risk ± 95% CI.
Figure Legends

Figure 1 Individual gymnast’s weekly training load (sRPE). Blue bars represent training during additional lockdown, isolation or when a gymnast had substantially restricted access to the gym (less than half of weekly sessions).

Figure 2 Weekly prevalence of a substantial injury. Prevalence ± Standard Error

Figure 3 Interaction between week-to-week changes in training load and the estimated risk of a substantial injury.

Figure 4 Interaction between an injury (any physical complaint including substantial injury to a different body part) in the preceding week and the estimated risk of a substantial injury.