

# PHYSICAL LITERACY OF FEMALE RECREATIONAL GYMNASTS

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*Original article*

DOI:10.52165/sgj.14.1.45-57

## **Abstract**

Children, especially girls, do not demonstrate physical activity (PA) and physical literacy (PL) levels associated with sufficient health benefits. Gymnastics is thought to be a suitable field for reinforcing children's PL and related elements, such as PA. This study aimed at assessing the PL level of female recreational gymnasts to detect areas of sufficient and insufficient development in their PL. For that, 101 8-12-year-old girls ( $M_{age}=10.1\pm 1.4$ ), who participated in recreational gymnastics programs for at least one year ( $M_{years}=3.7\pm 2.0$ ), were assessed by using the Canadian Assessment of Physical Literacy (CAPL-2). Average scores ( $M\pm SD$ ) for total PL and its related elements were calculated for all participants. Accordingly, each of them was classified into one out of the four CAPL-2's interpretive categories, indicating whether she was at a non-recommended ("beginning", "progressing") or recommended level ("achieving", "excelling"). Regression analysis examined the association of total PL score with participants' age and years of participation in gymnastics. Although the female gymnasts, similarly to same-age children worldwide, did not present adequate PL level, their fitness was sufficiently developed and they were excessively motivated/confident for PA. Adversely, other PL elements, i.e., their motor competence, PA knowledge, PA participation, were below the recommended levels, indicating deficiencies in their PL development. Age was associated with total PL ( $b=.440$ ,  $p=.0001$ ), whereas the years of gymnastics' participation were not ( $b=.090$ ,  $p=.325$ ). Participation in recreational gymnastics is important for enhancing several PL elements of female gymnasts; however, for developing the entire range of PL elements, the implementation of multicomponent gymnastics programs must be prioritized.

**Keywords:** Motor competence, Physical fitness, Physical activity, Health-related fitness knowledge, Motivation.

## **INTRODUCTION**

Physical literacy (PL), i.e., the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in physical activities for life (International Physical Literacy

Association, 2017), is recognized as an essential pathway to enhance physical activity (PA) participation and holistic development (Whitehead, 2010). Being comprised of multiple interacting elements, PL is a multidimensional

concept, aiming at creating not only competent but also motivated, empowered and knowledgeable movers, who choose to be physically active throughout life. In line with the PL concept, this all-round developmental process is a personal life journey, which begins in childhood by providing children with holistic PA experiences (Whitehead, 2010).

During the last years, research on the PL construct has made considerable progress, since assessment tools for children and youth were designed (Edwards et al., 2018) and implemented for population assessment (Kaioglou, Dania, & Venetsanou, 2020; Ramayudha, 2019; Tremblay et al., 2014, 2018) and program evaluation (Hennessy et al., 2018). According to preliminary research evidence, PL improves during childhood (Kaioglou et al., 2020; Tremblay et al., 2018); however, overall, children have been found to be insufficiently physically literate and greatly inactive (Kaioglou et al., 2020; Li et al., 2020; Ramayudha, 2019; Tremblay et al., 2014, 2018). Interestingly, girls are reported to be more inactive (Chen, Hammond-Bennett, Hypnar, & Mason, 2018; De Meester et al., 2016) and less physically literate than boys (Kaioglou et al., 2020; Li et al., 2020; Tremblay et al., 2018), indicating a population that possibly needs additional support along the PL journey. Moreover, findings manifest that physical education (PE) programs, focusing on affective, physical, cognitive, and behavioral outcomes, could enhance children's PL (Telford, Olive, Keegan, & Barnett, 2019), while participation in sport (at a non-elite level) is associated with elevated levels in certain PL elements, such as physical competence and daily PA participation (Damiris, Selemidi, Venetsanou, & Kaioglou, 2021). Even though the accumulation of past sport/PA experiences are thought to be critical to support children's PL journey (Whitehead, 2010), it is currently unknown if a child's previous engagement in a certain sport,

i.e., years of sport-specific participation, is positively associated with his/her PL level. Considering that lifelong PA is the major outcome of PL (International Physical Literacy Association, 2017) and that years of consistent sport participation in adolescence are associated with the PA engagement of young adults (Bélanger et al., 2015), we can assume a positive linkage between sport-specific participation and PL level, which is interesting to explore. Apart from this potential behavioral correlate of PL (i.e., long-term participation in sport), age has been suggested as a likely biological correlate (Kaioglou et al., 2020), however, due to the limited relevant studies, the strength of the latter has not been confirmed yet.

In reference to a sport that may have a positive effect on children's PL, gymnastics, which targets the all-round development of children (Werner, Williams, & Hall, 2012), has been proposed to be a suitable field for reinforcing children's PL (Baumgarten & Pagnano-Richardson, 2010; Flemons, 2013). That was based on the assumption that participation in gymnastics programs can significantly contribute to the development of children's essential PL elements, such as motor competence (Karachle, Dania, & Venetsanou, 2017; Rudd et al., 2017) and physical fitness (Lyulina, Zakharova, & Vetrova, 2013; Trajković, Madić, Sporiš, Aleksić, & Živčić-Marković, 2016). Furthermore, gymnastics positively influences the cultivation of other distinctive elements that physically literate individuals demonstrate, such as self-expression, interaction, creativity as well as other affective, cognitive (Baumgarten & Pagnano-Richardson, 2010; Flemons, 2013) and social skills (Shamshiri, Bagheri, Hashemy, Doostan, & Yazdani, 2013). Given the fact that all individuals develop PL at their own level, regardless of their physical condition or personal capabilities, through the acquisition of

challenging PA experiences (Whitehead, 2010), gymnastics can be useful in that direction, since it can be a challenging recreational activity suitable to all children's needs (Lulla, 2011).

Taking into consideration the gymnastics' potential contribution to PL enhancement (Baumgarten & Pagnano-Richardson, 2010; Flemons, 2013) and the assumption that girls need special attention in comparison to boys in that field due to the lower PA (Chen et al., 2018; De Meester et al., 2016) and PL levels they present (Kaioglou et al., 2020; Li et al., 2020; Tremblay et al., 2018), the current study recorded the overall PL status of female recreational gymnasts with the aim of detecting areas of sufficient and insufficient development on their PL journey. In addition, two related factors, i.e., age and the years of participation in gymnastics, were examined for their potential association with gymnasts' PL development.

Among the available PL assessment tools, the CAPL-2 (Healthy Active Living and Obesity Research Group [HALO], 2017; Longmuir et al., 2018) was selected in this study, because it is better supported for its psychometrics (Kaioglou & Venetsanou, 2020). This specific tool has been cross-culturally adapted for the Greek population of 8-12-year-olds (Dania, Kaioglou, & Venetsanou, 2020), while several aspects of its validity and reliability have been sufficiently supported (Dania, Kaioglou, & Venetsanou, 2019; Dania et al., 2020).

To our knowledge, this is the first study aiming to assess the entire PL construct in girls participating in gymnastics. Its findings will provide useful information about the potential of the specific PA to boost girls' PL development and, hopefully, it will unveil possible correlates of PL in childhood.

## METHODS

Participants were 101 8-12-year-old female recreational gymnasts ( $M_{\text{age}}=10.1\pm 1.4$ ) recruited from sport clubs located in Athens, Greece. According to participants' self-reports, they were engaged in some form of gymnastics (artistic, rhythmic, acrobatics) for at least one year ( $M_{\text{years}}=3.7\pm 2.0$ ) and they were training three to four times per week. Moreover, they reported that they did not participate in any other organized sport/PA. Convenience sampling techniques were followed to recruit the participants of the study. Each participant's parent or legal guardian was informed about the research purposes/procedures and subsequently he/she was asked to submit a written consent, while each girl gave her verbal consent before data collection.

According to the CAPL-2 manual (HALO], 2017), participants' PL is measured across four intercorrelated domains, i.e., Daily Behavior, Physical Competence, Motivation and Confidence, and Knowledge and Understanding. The Daily Behavior domain contains two measures of children's PA participation: (a) weekly self-perceived engagement in moderate to vigorous PA (MVPA), obtained by one item in the CAPL-2 questionnaire, and (b) the average amount of daily PA, recorded by pedometers. The Physical Competence domain is evaluated through both motor competence and physical fitness measures. Particularly, motor competence is assessed by the Canadian Agility and Movement Skill Assessment (CAMSA, Longmuir et al., 2017); a valid and reliable obstacle-type protocol of fundamental (jumping on two feet, sliding sideways, catching, overhand throw, skipping, hopping on one foot, kicking a ball) and complex movement skills (acceleration, deceleration, dynamic balance, transitions), which scores both the time the participants need to complete the protocol and the accuracy/quality of their

performance according to specific criteria (HALO, 2017). The 15m/20m Progressive Aerobic Cardiovascular Endurance Run (PACER) is used for assessing cardiovascular endurance. Specifically, for this study the 20m PACER was utilized. Muscular endurance is recorded by the plank protocol, for which the participants are asked to obtain and maintain the correct plank position for as long as possible. The Motivation & Confidence domain encompasses children's motivation and confidence to participate in PA; for their assessment, children respond to 12 items in the CAPL-2 questionnaire. Lastly, the Knowledge & Understanding domain, reflecting children's PA knowledge and autonomy to engage in PA, is assessed by five items in the corresponding questionnaire. The measures of Motivation & Confidence, Knowledge & Understanding as well as the self-perceived MVPA constitute the 18-item CAPL-2 questionnaire.

The CAPL-2 scoring system provides: (a) individual measure scores (raw scores converted to point scores), (b) domain scores, and (c) a total PL score. The total PL score (max of 100 points) is the sum of the four domains scores (Daily Behavior: max of 30 points, Physical Competence: max of 30 points, Motivation & Confidence: max of 30 points, Knowledge & Understanding: max of 10 points). Interpretation, based on gender and age, is facilitated by a four-category system, which stipulates the classification of participants as: (a) "beginning" (low level compared to same-age peers), (b) "progressing" (similar level compared to typical same-age peers), (c) "achieving" (meets minimum level recommended/association with expected health benefits), and (d) "excelling" (exceeds minimum level recommended/association with expected health benefits) (HALO, 2017).

The assessments were conducted at the sport clubs' facilities by members of the research team in accordance with instructions included in the CAPL-2

manual (HALO, 2017). For a group of 20 participants, the administration of all measures required approximately 60 min and three appraisers. Before data collection, examiners presented each measure to participants and each participant was allowed to perform a few familiarization trials. At the beginning, participants were split into two smaller groups, and they were simultaneously assessed in CAMSA and plank. After a 5-min rest period, the assessment of PACER followed. Upon the completion of the above three measures, all the participants were asked to fill in the CAPL-2 questionnaire, and at the end of the 60-min session the pedometers were handed to them. Participants were informed that these electronic devices should be worn constantly (except when they participate in water activities, take a bath or sleep) for seven consecutive days over the hip bone on the right-hand side of their body. It should be noted that a valid day of pedometer data entails at least ten-hour wear time and a range of recorded steps between 1,000 - 30,000; for calculating a pedometer score, three valid days are required (HALO, 2017).

Participants' average scores for total PL, domain and individual Daily Behavior and Physical Competence measures were determined according to the information provided by the CAPL-2 manual (HALO, 2017). Based on this manual, all participants were assigned to the corresponding CAPL-2 interpretive category for each of the above scores and percentages of them (%) across these categories were computed.

To examine the association of age and years of participation in gymnastics with total PL score, linear regression analysis was conducted. The proportion of total PL variance explained by the independent variables (coefficient of determination;  $R^2$ ), and the Beta standardized coefficients ( $b$ ), which indicate the relative importance of each independent variable in the prediction of the dependent one, were used

for interpreting the results of the analysis. Before the application of the regression analysis, Pearson's product-moment correlation coefficients ( $r$ ) were calculated to examine the associations among the variables. Preliminary checks proved that the regression analysis assumptions were met. Results were evaluated at  $p < .05$ . The IBM SPSS 26.0 statistical software was used for data analysis.

## RESULTS

Participants' total PL, domain and individual Daily Behavior and Physical Competence scores are summarized in Table 1. Based on these scores,

participants were assigned to the "progressing" category for their total PL as well as for the domains of Daily Behavior, Physical Competence and Knowledge & Understanding. In contrast, they were classified as "excelling" for the Motivation & Confidence domain. In respect of the individual measures, participants were characterized as "progressing" for daily PA and CAMSA; "achieving" for self-perceived MVPA and plank; "excelling" for PACER. Figures 1 and 2 present the distribution (%) of participants across the CAPL-2 interpretive categories for all the CAPL-2 scores.

Table 1.

*Means, standard deviations for total PL, domain, and individual measures scores.*

N=101	M±SD
DB <sup>a</sup>	13.42± 6.61
Self-perceived MVPA <sup>b</sup> (days/week)	4.79±1.77
Daily PA (steps/day)	8552.7± 3550.72
PC <sup>c</sup>	18.98± 5.28
CAMSA <sup>d</sup> (total score)	18.53± 4.07
20m PACER <sup>e</sup> (laps)	31.99± 20.09
Plank (sec)	94.95± 49.65
M & C <sup>f</sup>	26.22± 2.95
K & U <sup>g</sup>	6.37± 2.03
Total PL	64.98± 11.67

Legend:

Total PL score, domain scores, individual measure (point or raw) scores. Maximum CAMSA point score is 28 points. For Self-perceived MVPA, daily PA, 20m PACER and plank raw scores are reported.

<sup>a</sup>DB: Daily Behavior

<sup>b</sup>MVPA: Moderate to Vigorous Physical Activity

<sup>c</sup>PC: Physical Competence

<sup>d</sup>CAMSA: Canadian Agility and Movement Skill Assessment

<sup>e</sup>PACER: Progressive Aerobic Cardiovascular Endurance Run

<sup>f</sup>M & C: Motivation & Confidence

<sup>g</sup>K & U: Knowledge & Understanding

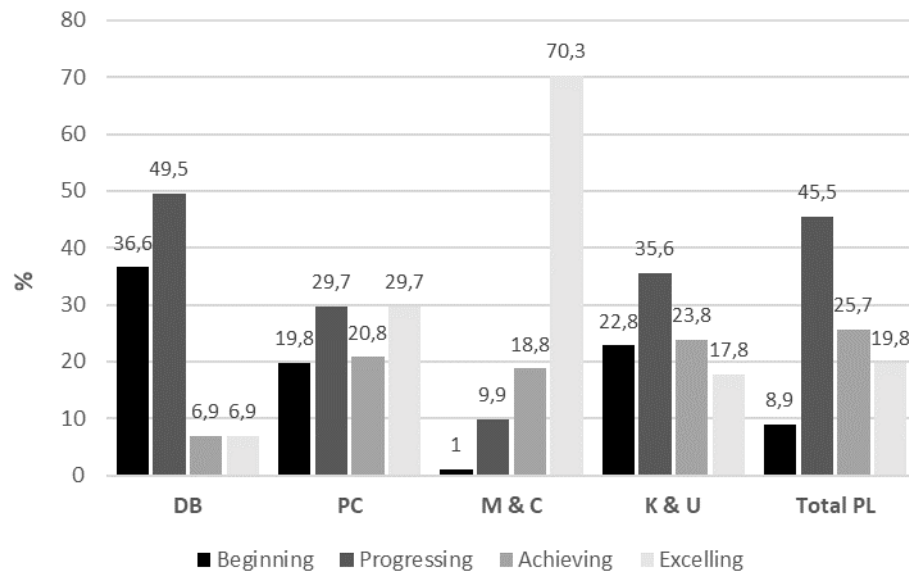


Figure 1. Distribution (%) of participants across the CAPL-2 interpretive categories for total PL and domain scores (DB: Daily Behavior, PC: Physical Competence, M & C: Motivation and Confidence, K & U: Knowledge and Understanding).

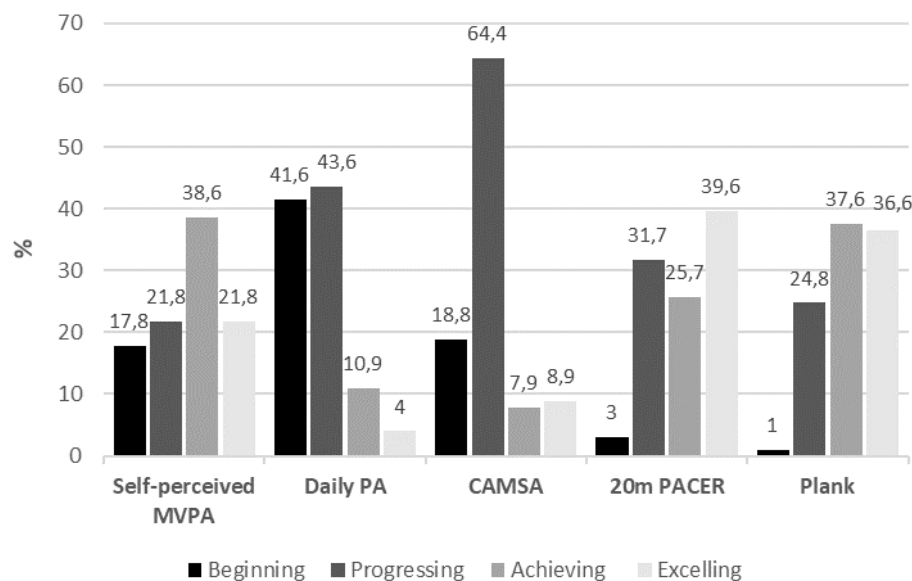


Figure 2. Distribution (%) of participants across the CAPL-2 interpretive categories for individual measure scores.

Both independent variables; age ( $r=.458$ ) and years of participation in gymnastics ( $r=.176$ ), were significantly and positively correlated with the total PL score ( $p<.05$ ). The regression model found to be statistically significant ( $F=13.626$   $p<.05$ ). The two independent variables

predicted 21.8% ( $R^2=.218$ ) of the total PL variance. According to Beta coefficients, the effect of age was significant ( $t=4.834$ ,  $b=.440$ ,  $p=.0001$ ), whereas the years of participation in gymnastics effect were not ( $t=.989$ ,  $b=.090$ ,  $p=.325$ ).

## DISCUSSION

Nowadays, children, especially girls, do not demonstrate PA levels (Chen et al., 2018; De Meester et al., 2016) and PL levels associated with sufficient health benefits (Kaioglou et al., 2020; Li et al., 2020; Tremblay et al., 2018). Considering the gymnastics' positive effect on developing certain PL elements, such as motor competence (Karachle, et al., 2017; Rudd et al., 2017), physical fitness (Lyulina et al., 2013; Trajković et al., 2016) affective, cognitive (Baumgarten & Pagnano-Richardson, 2010; Flemons, 2013) and social skills (Shamshiri et al., 2013), this study attempted to get a glimpse of the PL journey of female recreational gymnasts to recognize areas of sufficient and insufficient development in their PL. Our main finding was that, although these girls, similarly to other same-age children worldwide, did not present an adequate PL level, their fitness was sufficiently developed and, most importantly, they were excessively motivated and confident for PA. Adversely, the rest of their PL elements, such as their motor competence, PA knowledge and daily participation in PA, were below the recommended levels, indicating the presence of some deficiencies in their PL development. Their age was positively associated with the total PL level; however, their previous engagement in gymnastics was not. Overall, it seems that participation in gymnastics, even at a recreational level, is important for enhancing several PL elements of female gymnasts; however, for developing the entire range of PL elements, the implementation of multicomponent gymnastics programs must be prioritized for them.

Due to a lack of similar studies, our findings will be discussed in the light of the current PL literature. A comparison of female gymnasts with typical same-age children would give an idea about the possibility of gymnastics to contribute to

the improvement of total PL and its elements. Up to the present, only a few studies have recorded children's PL level; however, the information they add is indicative, as they represent populations of great cultural diversity. According to their findings, selected populations of Greek (Kaioglou et al., 2020), Canadian (Tremblay et al., 2018), Chinese (Li et al., 2020), Kenyan (Tremblay et al., 2014), and Indonesian (Ramayudha, 2019) children, measured by the CAPL, are presenting "progressing" level, meaning that they are currently deprived of the health benefits associated with the recommended "achieving" and "excelling" PL levels (CAPL's interpretation system; HALO, 2017). It is interesting that girls in this study received higher average total PL score ( $65 \pm 11.7$ ) than the above population samples (either considering only female samples, e.g., Greek: 61.3; Canadian: 62.2 or mixed gender ones, e.g., Kenyan: 59.0, Indonesian: 58.27). However, regardless of their superiority in the total PL score, they are still classified as "progressing", further confirming the insufficient PL level of children nowadays. The above finding suggests that girls' PL can benefit from engaging in recreational gymnastics; nevertheless, it should not be ignored that they need additional support along their PL journey, similarly to other same-age children worldwide.

With the aim of obtaining a more comprehensive picture about our female gymnasts' PL status, it is useful to look closely at the development of their individual PL domains and elements. For the Physical Competence domain, although they were found to be "progressing" both for the entire domain and the measure of motor competence (CAMSA), they demonstrated sufficient fitness levels, as measured by the two fitness protocols (PACER and plank). The finding that gymnasts presented low motor competence level (83.2% of them were below the recommended level) is also confirmed by the study of Damiris et al. (2021) in which

same-age gymnasts were examined by the same motor assessment test. However, this is in contrast with the findings of other studies concerning girls, though non-gymnasts (Khodaverdi, Bahram, Stodden, & Kazemnejad, 2016; Li et al., 2020; Tremblay et al., 2018). Our finding is quite unexpected, considering that participation in gymnastics is positively associated with the development of children's motor competence (Karachle et al., 2017; Rudd et al., 2017). Attempting to critically interpret this outcome, we should keep in mind that some of the motor skills assessed by CAMSA, i.e., the object control skills, are not common in gymnastics' practice. As such, although gymnasts, especially those participating in artistic gymnastics, adequately develop their locomotor skills through a variety of relative activities included in their practice, their object control skills are not similarly developed as they are given limited opportunities to do so in their practice (Šalaj, Milčić, & Šimunović, 2019). This is probably the reason why our female gymnasts performed low in this test. Importantly, given that motor competence is linked to girls' PA participation (Venetsanou & Kambas, 2017), female gymnasts' inadequate motor competence level found in this study should be an alarming issue. To make progress in this field, gymnastic programs offered to girls should not only target to improve gymnastics skills but also enhance skills such as catching, throwing, kicking (Šalaj et al., 2019). In essence, programs combining sport-specific practice with practice in a wide range of movement situations should be the best way ahead.

On the other hand, commenting on the sufficient fitness levels that the female gymnasts of this study presented (65.3% and 74.2% were either "achieving" or "excelling" for PACER and plank, respectively), it should be mentioned that this outcome was anticipated for two reasons. Firstly, there is enough evidence to support the positive association between

gymnastics and children's fitness (Lyulina et al., 2013; Trajković et al., 2016), and secondly, a similar finding was also detected in another relative study concerning gymnasts (Damiris et al., 2021). Considering that fitness fosters adoption of an active lifestyle (Chen & Gu, 2018) and favors children's overall PL development (Caldwell et al., 2020), it becomes clear that gymnasts are well equipped in that field. No doubt, this is not enough to help develop a physically literate child; however, fitness is an important element of the PL construct, and therefore it needs to be nurtured to actuate further improvements in PL.

In reference to the Daily Behavior domain, our findings are underwhelming, describing a noticeably inactive population. Particularly for their daily PA, a considerably large number (85.2%) of them were found to present inadequate level, with recorded daily steps ( $8552 \pm 3550$ ) far below the recommended PA guidelines for their age (i.e., 12000 steps/day: Colley, Janssen, & Tremblay, 2012). The insufficient PA level of gymnasts has been previously reported (Damiris et al., 2021). What is more, the above finding is highlighted in several reports concerning children, especially girls, who have been found to be more inactive than boys (Chen et al., 2018; De Meester et al., 2016), implying that this population is in greater need for relative actions to promote their PA behavior.

Regarding the Knowledge & Understanding domain, results similarly indicate that our female gymnasts did not display the recommended levels. This finding is common in most of the studies that recorded children's PL (Kaioglou et al., 2020; Ramayudha, 2019; Tremblay et al., 2014); however, it is opposite to the findings of the relative Canadian study, which revealed that children acquire sufficient knowledge related to PA (Tremblay et al., 2018). A justification for this may be the fact that the CAPL knowledge questionnaire is designed



according to PE content taught in Canada and therefore children are familiar with it. To interpret the finding of our study, it can be assumed that the Greek PE curriculum is primarily focused on performance outcomes, putting limited emphasis on reinforcing knowledge related to lifelong PA participation (Karandaidou, 2005). Probably this is true for recreational programs, too; however, no research has examined the goals of such programs so far. Given that there is a positive relationship between PA knowledge and PA participation (Demetriou, Sudeck, Thiel, & Honer, 2015), the perspective of gymnastics programs in Greece and elsewhere should be more holistic, encompassing cognitive goals, too.

Interestingly, contrary to the above unsatisfying findings, an impressive percentage of our female gymnasts (70.3%) demonstrated the highest level for the Motivation & Confidence domain, denoting girls' desire, and self-assurance to participate in PA. Since most of the reference PL studies report opposite results (Ramayudha, 2019; Tremblay et al., 2014, 2018), the above finding implies that recreational gymnastics is not just about learning sport techniques but is also an enjoyable experience for children, building commitment and positive attitudes towards PA (Cale, Waring, Webb, & Duncombe, 2011). The feeling of enjoyment related to gymnastics' participation is one of the reasons that parents enroll their children in such programs (Kurnik, Kajtna, Bedenik, & Kovac, 2013). Gymnasts' high motivational levels are probably also related to the fact that they enjoy participating in activities which encourage the development of skills, such as creativity and interaction with peers (Baumgarten & Pagnano-Richardson, 2010; Flemons, 2013), not to mention that they feel confident and competent engaging in such a challenging PA, which can be adjusted to their needs (Lulla, 2011). Furthermore, the finding that girls adopt more positive attitudes towards

gymnastics than boys (Cale et al., 2011) can further explain the excessive motivation that the participants of this study showed. Given that the affective elements of PL are thought to be essential for the interaction of elements within the PL construct (Whitehead, 2010), and that specifically children's intrinsic motivation has been shown to be associated with their participation in PA (Sebire, Jago, Fox, Edwards, & Thompson, 2013), recreational gymnastics programs can be considered an effective means for triggering their PA and PL levels.

In reference to the potential PL correlates examined in this study, it was revealed that during childhood the PL journey is positively influenced by age. The association of age with children's (both boys' and girls') PL development is also supported in the literature (Kaioglou et al., 2020; Tremblay et al., 2018). As shown in the reference studies, the overall PL level increases with age mainly due to improvements in children's motor competence and fitness (Kaioglou et al., 2020; Tremblay et al., 2018). On the other hand, the number of years girls participated in gymnastic programs did not have a positive effect on their total PL level. Since this factor has not been previously examined, our finding cannot be easily interpreted. However, considering that participation in PA/sport during adolescence has been found to positively relate to adult' PA engagement (Smith, Gardner, Aggio, & Hamer, 2015), it can be assumed that during childhood this effect is not as important as it can be later in life. Also, it should be noted that the specific information was obtained via children's self-reports and was not verified by their parents/guardians.

This study has its strengths and limitations. Referring to its strengths, this is the first study to have investigated the PL status of female recreational gymnasts, with the aim of detecting areas of sufficient and insufficient development on their PL journey, and thus to evaluate the

possibility of the specific PA to boost girls' PL development. Furthermore, it expands the evolving PL research, contributing valuable information about the development of PL elements in childhood. Undoubtedly, the use of a valid and reliable PL tool, which addresses the entire PL construct (HALO, 2017), adds credibility to its results. On the other hand, although we should not ignore the significance of cross-sectional designs, given the everlasting nature of PL, longitudinal studies should be conducted in the future to better reflect gymnasts' PL journey. Furthermore, since this study concerned only female gymnasts, gender is another factor that should be examined by future research. Additionally, future studies should focus on comparing different forms of gymnastics for their association with the PL development.

The key message of this study is that participation in recreational gymnastics programs can be beneficial for girls, as it is associated with sufficient levels in important PL elements, such as physical fitness and motivation and confidence for PA. Currently, their total PL level is not adequate; however, these girls are at the beginning of their PL journey, and they have ample time to develop the skills and characteristics needed as this journey proceeds. However, for this to be possible they should be encouraged to engage in gymnastics programs, which will be multidimensional in nature, focusing not only on physical but also affective, cognitive, and behavioral goals (Whitehead, 2010).

## CONCLUSION

This is the first study that examined the PL status of female recreational gymnasts with the aim of recognizing areas of sufficient and insufficient development on their PL journey. Our main finding was that although these girls, similarly to other same-age children worldwide, did not present an adequate PL level, their fitness

was sufficiently developed and, most importantly, they were excessively motivated and confident for PA. Conversely, the rest of their PL elements, such as their motor competence, PA knowledge and daily participation in PA were below the recommended levels, indicating the presence of some deficiencies in their PL development. Their age was positively associated with the total PL level; however, their previous engagement in gymnastics was not. Overall, it seems that participation in gymnastics, even at a recreational level, is important for enhancing several PL elements of female gymnasts; however, for developing the entire range of PL elements, the implementation of multicomponent gymnastics programs must be prioritized for them.

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Article received: 20.8.2021

Article accepted: 7.12.2021

