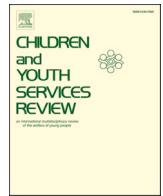




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Longitudinal insights into youth psychological adaptation: when does organized sport participation matter to buffer against child maltreatment?

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ABSTRACT

Considering the high prevalence of child maltreatment worldwide and its harmful consequences, it is essential to identify ways to promote resilience in victims. This two-wave longitudinal study investigated the potential role of sport participation in an organized context, an understudied factor, in sustaining positive psychological adaptation. Using electronic tablets in their classrooms, a total of 1,836 adolescents, aged between 14 and 18 years at wave 1 (T1: $M = 14.74$; $SD = 0.84$), completed self-reported questionnaires assessing history of child maltreatment, sport participation (i.e., structured, coach-led activities), violence within sport contexts among sport participants, and psychological adaptation (life satisfaction, internalized symptoms). At T1, 67.5% of the sample reported having experienced at least one form of child maltreatment and 54.4% were involved in organized sport. Path analysis revealed that child maltreatment at T1 was significantly associated with lower life satisfaction and higher internalized symptoms at T1, and with changes in internalized symptoms a year later at T2. The association between organized sport participation at T1 and changes in life satisfaction from T1 to T2 was conditional to the experience of child maltreatment, but not changes in internalized symptoms from T1 to T2, after accounting non-organized sport participation and violence in the context of sport – the latter being reported by more than half of sport participants and independently associated with poorer psychological outcomes. These results did not differ significantly between boys and girls. Overall, these findings suggest that organized sport participation may be associated with more favorable psychological adaptation among adolescents exposed to child maltreatment under specific conditions. Importantly, these associations were observed after accounting for exposure to violence within the sport context, underscoring the heterogeneous nature of sport environments.

1. Introduction

Child maltreatment (CM) is an all too pervasive issue: in the general population, more than three in five adults report having experienced at least one form of maltreatment during childhood (before 18 years old),

including physical, sexual and emotional abuse, neglect, and exposure to intimate violence (Afifi et al., 2026). CM is not only linked to harmful consequences during adolescence, but also to negative outcomes that can persist into adulthood (Dion et al., 2016; Jaffee et al., 2018; Strathearn et al., 2020). Youths who have experienced CM tend to report

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lower levels of psychological adaptation and well-being (Weber et al., 2016; Winter et al., 2022). It is therefore essential to identify and promote resilience factors for victims, to buffer the long-term consequences of maltreatment and foster psychological adaptation. Several reviews have documented a wide range of individual, familial, and community-level resilience and protective factors following CM (e.g., Meng et al., 2018). Beyond these well-established factors, sport participation has been identified as one of the critical factors associated with better psychological adaptation among youth (Eime et al., 2013; Guddal et al., 2019; Super et al., 2018); however, emerging evidence suggests that these benefits may depend on the quality and safety of the sport environment (Daignault et al., 2023; Gattis & Moore, 2022). Therefore, the present study aimed to examine organized sport participation as a potential context that may support psychological adaptation among adolescents with a history of maltreatment, particularly when sport occurs in safe and supportive environments.

Greater sport participation has been associated with fewer psychological difficulties (e.g., symptoms of anxiety and depression) (Panza et al., 2020) in children and adolescents. Yet, some studies suggested possible detrimental effects of sport participation. For example, extreme weight-control behaviors in adolescent athletes have been found to be prevalent in weight-related organized sports settings (Boudreault et al., 2022). Moreover, sport participation has been associated with more symptoms of anxiety and depression (Hoffmann et al., 2022) and binge drinking (Williams et al., 2020) in adolescents. Other studies have also highlighted the high rate of violence and abuse in sports contexts (Pankowiak et al., 2023; Parent & Vaillancourt-Morel, 2021) as well as its potential contribution to negative outcomes; a violent and abusive sporting environment would not only prevent positive outcomes, but also cause serious harm (Gattis & Moore, 2022; McMahon & Kerry, 2022).

Whether these differential effects of sport participation extend to adolescents exposed to CM remains unclear. More specifically, despite extensive work on resilience following CM (Meng et al., 2018), sport participation has received little attention as a protective or resilience-related context. A recent systematic review focusing on community-level protective factors identified only three studies examining sport-related contexts, underscoring the limited and fragmented nature of the evidence base in this area (Jean-Thorn et al., 2023). In addition to the sport-related studies identified in this review, only a small number of empirical studies have directly examined the potential protective role of sport participation among youth exposed to maltreatment. A first study showed that in women with a history of child sexual abuse from New Zealand ($n = 138$), those who stated being good at sports reported a better psychological functioning, in comparison to those who did not (Romans et al., 1995). In a study conducted among 9,113 adolescents aged 16–19 years in Iceland, sport participation was negatively and directly related to depressive symptoms and anger, but it did not attenuate the association between sexual abuse and these outcomes (Asgeirsdottir et al., 2010). Similar results were obtained using a subsample of adolescents aged 16–17 years ($n = 5,803$), where sport participation was positively related to life satisfaction, but it did not moderate the association between sexual abuse and life satisfaction (Asgeirsdottir & Sigfusdottir, 2021). Another study conducted in Italy among 4,829 youths aged 13 to 21 revealed that the link between bullying victimization and depressive symptoms was stronger among those who had not participated in sports during the last year (Holbrook et al., 2020). All these studies relied on cross-sectional designs and focused on only one form of victimization. As such, the direction and conditional nature of the associations between maltreatment, sport participation, and psychological outcomes remain largely unresolved.

To our knowledge, only two longitudinal studies have focused on the relations between childhood maltreatment, sport participation, and psychological outcomes. One longitudinal study conducted in a sample of 9,668 individuals revealed that among participants with a history of adverse childhood experiences, those who were involved in team sports

during adolescence (wave 1 = adolescents in grade 7 to 12) had lower odds of reporting depressive symptoms or receiving a diagnosis of depression and/or anxiety 13 to 14 years later (wave 2 = adults aged between 24 to 32 years) (Easterlin et al., 2019). Sex-stratified analyses also revealed that all these associations were significant for boys, whereas among girls, they were significant only for anxiety. Another study showed that participation in sport clubs was associated with higher school engagement over three years in 790 adolescents aged 12–16 years at wave 1 who had been investigated by Child Protective Services for maltreatment exposure (Kwak et al., 2018). However, it was not associated with lower levels of depression or trauma symptoms in subsequent waves. Based on these studies, it is difficult to draw conclusions about the role of sport participation in buffering the harmful effects of CM. Importantly, these studies did not explicitly test the conditions under which sport participation may or may not operate as a buffering factor. Moreover, they did not control for victimization experiences occurring within the sport context, which may undermine or even negate the potential protective effects typically attributed to sport participation.

Sport participation can take several forms. However, previous studies evaluating its association with psychological outcomes among individuals with a history of maltreatment have mainly focused on non-specific involvement in sports or team sport participation. Furthermore, none of the studies considered the distinction between non-organized and organized sport participation (i.e., being part of a club or federation, participating in tournaments or competitions). Organized sport participation may enhance well-being, as it can provide supervision otherwise absent at home and increase opportunities for positive social interactions (Mahoney et al., 2006). This structured context aligns with broader resilience frameworks emphasizing the role of supervised, socially embedded environments in promoting adaptive functioning following adversity. For instance, research has shown that organized sport participation is associated with additional well-being benefits for adolescents, beyond what is gained from participation in other recreational physical or sport activities (Wilson et al., 2022). A recent systematic review and meta-analysis also supported the potential protective effect of organized sport participation during adolescence against depressive and anxiety symptoms (Panza et al., 2020). The authors highlighted several limitations in the current literature on sport participation, including an overemphasis on assessing psychopathological symptoms and a lack of focus on positive outcomes. After all, the objective of identifying resilience factors should be not only to prevent illness, but also to improve overall well-being and aim for optimal psychological functioning in adolescents.

From a developmental and ecological perspective, CM is understood as a risk factor that unfolds over time through interactions between individual characteristics and contextual environments (Cicchetti & Lynch, 1995). Organized leisure contexts, such as sport, may function as developmental settings that either promote or hinder psychological adaptation depending on their structure and social climate.

Prior cross-sectional studies have shown associations between our predictors – CM (Kolar et al., 2024; Winter et al., 2022) or sport participation (Eime et al., 2013; Panza et al., 2020; Wilson et al., 2022) – and our indicators of psychological adaptation – life satisfaction and internalized symptoms. To isolate the longitudinal association between organized sport participation and psychological adaptation, and recognizing the cross-sectional associations between CM, sport participation, and psychological adaptation, we included baseline levels of life satisfaction and internalized symptoms in the current model, and non-organized sport participation as a covariate. This allowed us to distinguish between structured, supervised sport contexts and those of unstructured sport participation. Additionally, given the high prevalence of violence in sports (Pankowiak et al., 2023; Parent & Vaillancourt-Morel, 2021), which could potentially influence the relations between experiences of CM and psychological adaptation, this variable was included as a covariate to account for heterogeneity in sport

environments and to avoid overestimating the potential protective role of organized sport participation. Finally, gender invariance was tested to assess whether our model operates similarly for teenage boys and girls.

2. Methods

A two-wave longitudinal design was used to examine temporal associations between CM, sport participation, and psychological adaptation over time. This design is consistent with prior research emphasizing the importance of prospective approaches when examining developmental risk and protective factors.

2.1. Procedures

To ensure sample diversity, a research coordinator contacted seven schools located in urban, semi-urban, and rural areas across three regions with varying socioeconomic backgrounds in the province of Quebec, Canada. Six agreed to participate, and one refused since there was another ongoing research project in their school. The first wave of this study (T1) was therefore conducted from October to December 2019 and recruited adolescents in grade 9 or 10. The second wave (T2) was conducted approximately 12 to 18 months later, from November 2020 to June 2021, using the same data collection procedures.

As adolescents can provide their own informed consent from age 14 in Quebec, Canada, all participants signed a written consent form before completing questionnaires on an electronic tablet during class hours. Almost all participants present during data collection (over 97%) completed the questionnaire. During data collection, two to three trained research assistants – students in psychology and social work – were present to explain the study and the consent process, and to answer any questions. Although support resources were offered to all participants, only one student requested assistance. The situation involved a minor concern and was addressed on-site with minimal support, as no signs of distress were observed. This aligns with the findings of a meta-analysis (Jaffe et al., 2015) and a study conducted among children and adolescents in the United States (Finkelhor et al., 2014), which concluded that surveys addressing sensitive topics, such as CM, are associated with low levels of participant distress.

2.2. Participants

Participants were drawn from a school-based community sample. Inclusion criteria were: (a) being enrolled in Grade 9 or 10 at participating schools at wave 1, (b) being at least 14 years of age, and (c) providing informed consent. No exclusion criteria were applied based on experiences of CM or levels of psychological well-being. CM was assessed dimensionally within the full sample, allowing the inclusion of adolescents with varying levels of exposure, including those with no reported maltreatment. The final sample included 1,836 adolescents aged between 14 and 18 years ($M = 14.74$; $SD = 0.84$). A total of 54.8% of teenagers identified as boys ($n = 1007$), 41.7% as girls ($n = 765$), 1.5% ($n = 26$) identified with other gender identities (nonbinary, gender fluid, two-spirit, or “other”), and 2.1% did not answer the question ($n = 38$). As for cultural ethnicity, 65.8% of the sample identified as Québécois and 9.7% as Canadian. The remaining 24.5% identified with other cultural ethnicities, including African (6.2%), Latin/South American (2.9%), Caribbean (2.0%), Indigenous (1.6%), and Western European (1.2%), among others.

For the second wave (T2), and using the same procedure, 811 adolescents from the baseline sample (44.2%) completed the questionnaires. They were aged from 15 to 19 years ($M = 15.83$; $SD = 0.73$), and 51.4% identified as boys ($n = 417$), 46.6% identified as girls ($n = 378$), 1.6% identified with other gender identities ($n = 13$), and 0.4% did not answer the question. Unfortunately, one school did not participate in this follow-up because they wanted to minimize the number of outsiders coming to their school (as a COVID-19 transmission prevention

measure). Moreover, some participants had moved to another school, were absent during data collection, or could not be matched to their data at wave 1. However, because the data were collected anonymously, it was not possible to determine the number of participants corresponding to each of these reasons for non-participation at wave 2. From the baseline sample, participants who did not take part in the second wave included 61.1% who identified as boys ($n = 626$), 34% as girls ($n = 348$), 2.1% with other gender identities, and 2.9% who did not answer this question ($n = 30$). This study obtained ethical approval from the Université du Québec à Chicoutimi.

2.3. Measures

2.3.1. Sport participation (Wave 1)

Sport participation was assessed using a researcher-derived questionnaire with two dichotomous (yes/no) items, consistent with prior large-scale epidemiological and school-based studies that used brief self-report indicators to assess sport participation (Guddal et al., 2019; Hoffman et al., 2022). The first one assessed general sport participation (“Do you practice one or multiple sports at the moment?”). Those who answered yes were then asked a second question, which assessed organized sport participation (“Are you involved in one or multiple organized sports (e.g., you take part in competitions or tournaments, you are a member of a sport club or federation?”). Participants were then categorized into two dummy variables: 1) non-organized sport participation only (yes/no), and 2) organized sport participation (yes/no). This distinction between organized and non-organized (or recreational) sport participation has been used in the literature and reflects differences in structure and supervision that are relevant for adolescent development (e.g., Fraser-Thomas et al., 2005; Wilson et al., 2022).

2.3.2. Child maltreatment (Wave 1)

Participants were asked if they had experienced CM during their life, including parental physical abuse, parental emotional abuse, parental neglect, exposure to parental partner violence, and sexual abuse. We used adapted items from the Longitudinal Study of Adolescent Health (Hahn et al., 2010) to assess experiences of physical abuse (1 item: “How often did a parent/guardian push you, shove you, hit you or twist your arm?”) and parental neglect (2 items; $r = 0.67$, e.g., “During your childhood, how often did a parent/guardian not take care of your basic needs, such as keeping you clean or providing food or adequate clothing?”). An adapted version of items used by Tourigny et al. (2008) and of the Early Trauma Inventory Self Report–Short Form (Bremner et al., 2007) was used to assess sexual abuse (three dichotomous items; $\alpha = 0.67$, e.g., Did anyone ever have genital sex with you against your will?), and emotional abuse (2 items; $r = 0.68$; e.g., “How often did a parent/guardian ridicule or humiliate you?”). To assess exposure to parental partner violence, we used three adapted items ($\alpha = 0.94$; e.g., I have seen one of my parents/guardians do this to my other parent/guardian: push, shove, slap, twist the arm, throw an object that could hurt...” from the Conflict Tactics Scales (Straus et al., 1996). Items from each form of maltreatment were combined into a dichotomized (yes/no) score; if participants answered yes to any item, they were categorized as having experienced that form of maltreatment. Then, dichotomized scores for each of the five forms of maltreatment were summed to create a cumulative CM score ranging from 0 to 5, representing the total number of maltreatment forms experienced.

2.3.3. Life satisfaction (Waves 1 and 2)

The 5-item Satisfaction with Life Scale (Bacro et al., 2020; Diener et al., 1985) was used to assess life satisfaction (e.g., “I am satisfied with my life”). Participants responded using a 7-point Likert scale, and the overall score ranged from 0 to 30, with higher scores indicating greater life satisfaction. The scale showed good internal consistency for both waves ($\alpha = 0.86$ and 0.87 respectively), which were strongly correlated ($r = 0.56$).

2.3.4. Internalized symptoms (Waves 1 and 2)

The Emotional Symptoms subscale of the Strengths and Difficulties Questionnaire (D'Acremont & Van der Linden, 2008; Goodman, 2001) was used. This 5-item subscale is answered using 3-point Likert scales (e. g., "I worry a lot", "I am often unhappy, down-hearted or tearful") and the total score varied from 0 to 10, a higher score indicating higher levels of internalized symptoms. Internal consistency was good in both waves ($\alpha = 0.81$ and 0.83 , respectively), which were strongly correlated ($r = 0.60$).

2.3.5. Violence in sports (Wave 1)

Violence in sports was assessed using an adapted and shortened version of the validated Violence Toward Athletes Questionnaire (VTAQ; Parent et al., 2019). This self-reported measure assesses different forms of interpersonal violence (psychological/neglect, physical, and sexual) experienced in the organized sports context, based on the perpetrators of the violence, including peer-athletes such as teammates and opponents (VTAQ-A; 5 items), coaches (VTAQ-C; 9 items), and parents (VTAQ-P; 6 items). Examples of items are "In the sport environment, a coach has insulted, humiliated, or made fun of you", "In the sport environment, a coach has shaken, pushed, grabbed or thrown you". "In the sport environment, an athlete or a group of athletes has forced you to have sexual contact that you didn't want (examples: kissing, sexual intercourse)." Participants rated the occurrence of these abusive events on a 4-point Likert scale (ranging from 0 = *never*, to 3 = *often, more than 10 times*). In the present study, a total score was created by summing both the VTAQ-A and VTAQ-C subscales. Violence perpetrated by parents (VTAQ-P) was not used to avoid an overlap with the CM measure. The internal consistency was $\alpha = 0.63$ for the VTAQ-A and $\alpha = 0.80$ for the VTAQ-C, and both versions were strongly correlated ($r = 0.56$).

2.4. Data analysis

Descriptive statistics were produced using SPSS version 28.0, and path analyses with Mplus 8 (Muthén & Muthén, 1998–2012). Specifically, the outcomes at T2 (internalized symptoms and life satisfaction) were regressed on their measurement at baseline to account for the passage of time (the differential stability over time). Therefore, in the path analysis model, outcomes at T2 did not only represent the value at wave 2, but rather assessed the residualized change from T1 to T2 that was not accounted for by the stability of the measure over time. Outcomes at T1 (baseline) and T2 (change from baseline to wave 2) were regressed on T1 predictors: CM, sport participation (organized and non-organized), and violence in sports. Outcomes at T2 were also regressed on the interaction between CM and organized sport participation (to assess conditional effects).

Violence in sports was measured exclusively among participants who reported engaging in organized sports, given the specific nature of this variable pertaining to organized activities. Therefore, missing-data pattern analyses were conducted, and the results indicated significant associations between violence in sports and missingness in our outcomes. Nonetheless, even though it revealed a not missing at random (NMAR) pattern, we still included the violence in sports variable in our model, which served two functions: an explicit one, to study its effect on the benefits of sport participation, and an implicit one, as a control variable to mitigate any associated bias introduced by NMAR missing data pattern (Newman, 2014). The Full Information Maximum Likelihood (FIML) estimator was utilized as the default estimator in Mplus.

To evaluate gender differences in the hypothesized effects, a multiple-group gender invariance path analysis was conducted using a chi-squared difference test between the configural and the constrained models. It was not possible to assess gender invariance for individuals who self-identified as having other gender identities due to the small sample size for these adolescents ($n = 26$ at T1 and $n = 13$ at T2). Mean-level differences across gender groups on study variables, including all

adolescents with other gender identities, were further examined using Welch's ANOVAs with Games-Howell post-hoc tests. Age was also not included as it was not significantly correlated with any variables of interest.

Model fit adequacy was evaluated using several indices. Indicators of good fit include a non-significant chi-square value, a CFI value of 0.90 or higher, and an RMSEA value below 0.06 (Hu and Bentler, 1999). Given the sensitivity of chi-square tests to sample size, we also utilized the ratio of chi-square to degrees of freedom (χ^2/df). Values less than 5 suggest a satisfactory fit, with a more conservative cut-off value of 3 being preferable (Ullman, 2001).

3. Results

3.1. Descriptive results

In the present sample, 1,240 (67.5%) reported having experienced at least one form of CM at T1. Specifically, 32.6% of adolescents reported having experienced one form of CM, 16.1% two forms, and 18.8% three or more forms (2% of participants did not answer). In addition, 427 (23.3%) teenagers reported no sport participation, 405 (22.1%) reported practicing non-organized sports only, and 998 (54.4%) reported being involved in one or multiple organized sports (0.2% did not answer). Among participants who reported practicing an organized sport, 22.2% reported practicing less than 5 h per week, 35.3% between 6 and 10 h, 19.9% between 11 and 15 h, 12.2% between 16 and 20 h, and 9.8% more than 21 h per week (0.6% did not answer). Notably, more than half of adolescents involved in organized sport reported experiencing violence within this context (55.0%). Specifically, 15.4% of them reported having experienced one episode of sport violence, 36.1% between two and nine episodes, and 3.5% more than ten times. Psychological violence and neglect (53.9% reported at least one event) was the most frequent form of sport violence reported. Table 1 presents the descriptive statistics and correlations among study variables. Descriptive statistics stratified by gender are presented in Table 2.

3.2. Examination of the longitudinal model

To test whether the association between organized sport participation and psychological adaptation over time is conditional to CM or differs depending on CM, a path analysis model including all participants was estimated. The model demonstrated an excellent fit to the data, $\chi^2(6) = 19.609$, $p = 0.003$ ($\chi^2/df = 3.268$), SRMR = 0.037, RMSEA = 0.035, CFI = 0.991, TLI = 0.961. Fig. 1 presents the conceptual and analytic model tested, illustrating the significant associations. A complete version of the model, showing all tested associations (both significant and non-significant), is provided in the Supplementary Material. Direct effects and interaction term predicting life satisfaction and internalized behaviors at T2 are presented in Table 3.

Results revealed that the predictors (CM and organized sport participation) and the covariates (sport violence and non-organized sport participation) were all significantly and weakly or moderately associated with life satisfaction and internalized symptoms measured at T1. Both outcomes were then associated with the same outcomes a year later at T2, with internalized symptoms displaying a strong association between T1 and T2, and life satisfaction at T1 showing a moderate association with life satisfaction at T2.

In addition, organized sport participation was directly and weakly associated with changes in internalized symptoms and life satisfaction from T1 to T2. Compared with adolescents who did not participate in organized sports, those who participated in organized sports experienced fewer internalized symptoms at T1 and a greater decrease in internalized symptoms over time. They also experienced more life satisfaction at T1 and a greater increase in life satisfaction over time. Non-organized sport participation predicted changes in life satisfaction from T1 to T2, but not in internalized symptoms. Therefore, adolescents

Table 1
Descriptive Statistics and Correlations for Study Variables.

Outcomes	Mean	SD	1	2	3	4	5	6
1. Child Maltreatment (Wave 1)	1.34	1.30	–					
2. Life Satisfaction (Wave 1)	21.41	6.31	–0.37**	–				
3. Life Satisfaction (Wave 2)	20.51	6.42	–0.30**	0.56**	–			
4. Internalized Symptoms (Wave 1)	3.05	2.83	0.31**	–0.45**	–0.33**	–		
5. Internalized Symptoms (Wave 2)	3.05	2.88	0.21**	–0.31**	–0.37**	0.60**	–	
6. Violence in Sports (Wave 1)	2.24	3.83	0.19**	–0.16**	–0.17**	–0.16**	0.05	–

Note. M = Mean; SD = Standard Deviation. Sample sizes vary across associations due to missing data (n = 429–1800). *p < 0.05. **p < 0.01.

Table 2
Descriptive Statistics in function of genders for Study Variables.

Outcomes	Boys	Girls	Others
1. Child Maltreatment (Wave 1)	1.17 (1.20) ^a	1.53 (1.35) ^b	2.62 (1.75) ^c
2. Life Satisfaction (Wave 1)	22.33 (5.74) ^a	20.48 (6.71) ^b	14.35 (6.48) ^c
3. Life Satisfaction (Wave 2)	21.22 (6.28) ^a	20.05 (6.43) ^b	10.40 (5.77) ^c
4. Internalized Symptoms (Wave 1)	2.00 (2.28) ^a	4.33 (2.88) ^b	5.75 (3.00) ^b
5. Internalized Symptoms (Wave 2)	1.70 (2.13) ^a	4.21 (2.93) ^b	4.20 (2.68) ^b
6. Violence in Sports (Wave 1)	2.50 (4.17) ^a	1.66 (2.78) ^b	3.71 (3.04) ^{ab}

Note. Values are M (SD). Group differences were tested using Welch's ANOVA with Games–Howell post-hoc tests. Means sharing the same superscript letter do not differ significantly, whereas means with different superscripts differ significantly at p < 0.05. Sample sizes varied across variables due to missing data: Wave 1 (boys n = 591–1006, girls n = 411–764, others n = 7–26) and Wave 2 (boys n = 362–364, girls n = 397–399, others n = 5). Estimates for the “Others” group should be interpreted with caution due to small sample sizes.

who participated in non-organized sports reported greater life satisfaction and lessen internalized symptoms at T1, and a greater increase in life satisfaction over time, compared to those who did not participate in non-organized sports. Overall, these results suggest that participants who did not practice any sport reported less life satisfaction at T1 and consequently fewer changes from T1 to T2. Finally, CM and violence in sport were associated with changes from T1 to T2 in internalized symptoms, but not life satisfaction. That is, adolescents who experienced CM and/or violence in sports reported higher levels of internalized symptoms at T1, and a greater increase in internalized symptoms over time.

3.3. The interaction between organized sport and child maltreatment

The results indicated that the association between organized sport and changes in life satisfaction from T1 to T2 was conditional on the level of CM. This interaction is illustrated in Fig. 2, which depicts the simple effects of organized sport participation on life satisfaction across levels of CM. Specifically, organized sport participation was associated with a greater increase in life satisfaction at low ($\beta = 0.396, p < 0.001$) and moderate ($\beta = 0.262, p < 0.001$) levels of CM. However, for adolescents with higher levels of CM, organized sport participation was not associated with the trajectory of life satisfaction ($\beta = -0.128, p = 0.207$).

3.4. Gender invariance

Invariance analyses revealed a non-significant chi-square difference, $\Delta\chi^2(8) = 7.992, p = 0.434$. Therefore, although mean-level differences were observed across gender groups for several variables (see Table 2), the links between CM, sport participation, and the two outcomes at T1 and T2 did not differ significantly between boys and girls, suggesting that the model was gender-invariant. Therefore, following the principle

of parsimony, we retained the model that included all adolescents, including non-binary participants.

4. Discussion

Considering the distressing reality of childhood maltreatment (CM) and its associated long-term consequences, it is essential to better understand which factors may be associated with more favorable adaptation among victims during the important life transition that adolescence represents. In this context, this large-scale longitudinal study aimed to examine whether the association between organized sport participation and psychological adaptation differed according to adolescents' exposure to CM, while accounting for exposure to violence within sport. Overall, the results suggest that organized sport participation may support psychological adaptation, particularly in relation to life satisfaction among adolescents who have experienced low and moderate levels of CM. Furthermore, organized and non-organized sport participation were directly associated with better outcomes, both cross-sectionally and longitudinally. However, the high prevalence of violence reported within sport contexts points to the heterogeneous nature of these environments, suggesting that the benefits of sport participation may vary according to the safety and quality of the environment. When free from violence, sport participation may contribute to resilience processes.

4.1. Child maltreatment and psychological adaptation

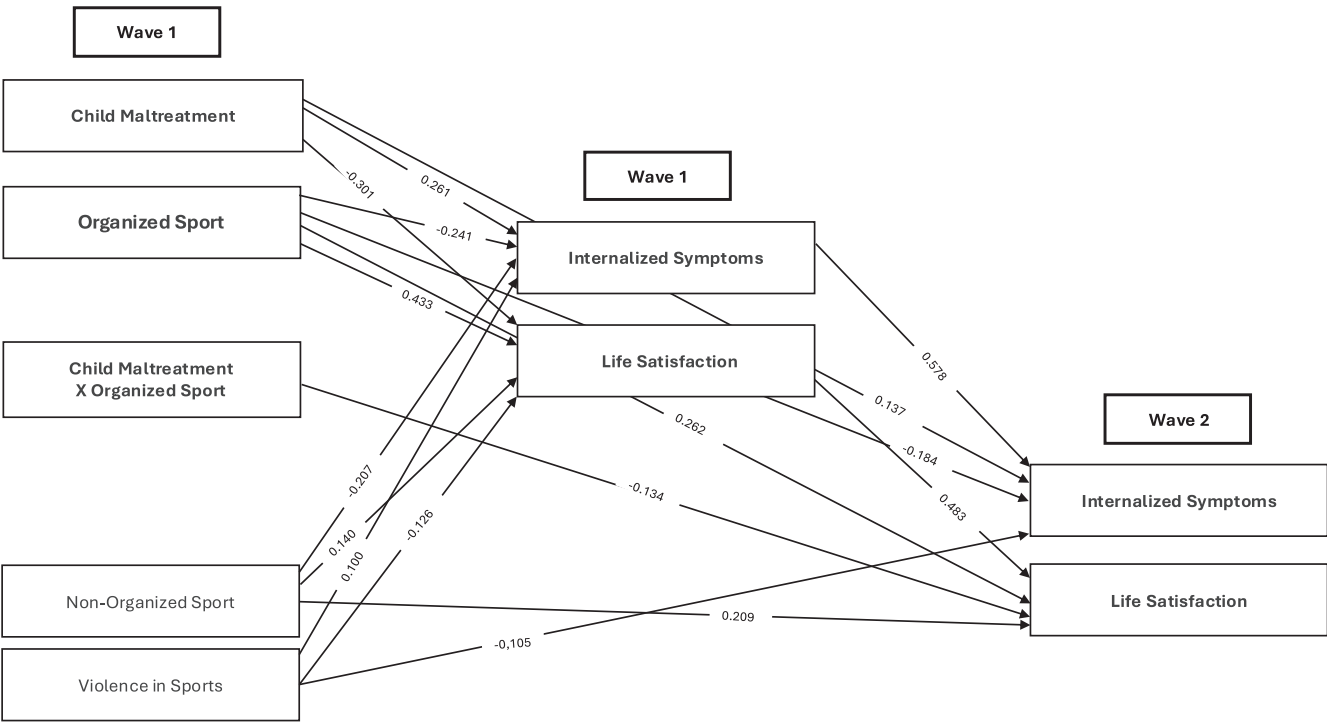
Higher levels of CM were associated with lower life satisfaction in the short term and with greater internalized symptoms in both the short and longer term. These findings align with previous studies that have identified both cross-sectional and longitudinal links between CM and reduced psychological adaptation during adolescence (Dion et al., 2016; Hagborg et al., 2017; Kolar et al., 2024). Therefore, given that victims of CM show lower levels of psychological adaptation, it is important to examine protective factors that may promote resilience, such as organized sport participation.

4.2. Organized sport participation

Our study was the first to develop an integrative model of the role of sport participation in the relations between CM and psychological adaptation. The cross-sectional and longitudinal associations between both organized and non-organized sport participation and life satisfaction and/or internalized symptoms are in line with several previous studies on the positive effects of sports (Eime et al., 2013). These results suggest that sports may be beneficial for both victims and non-victims of CM, as found in previous studies that also included adolescents who were victims of CM or bullying (Asgeirsdottir et al., 2010; Asgeirsdottir & Sigfusdottir, 2021; Easterlin et al., 2019; Holbrook et al., 2020) as well as in a study conducted among adolescents investigated by child protective services (Kwak et al., 2018), although in that latter study it was only related to school engagement, and not depression or trauma symptoms.

The structure of sport participation also appears to be related to better outcomes. In the present study, organized sport participation

Analysis of Child Maltreatment, Sport Participation, Violence in Sports, and Psychological Adaptation



Note. Only significant predicting associations ($p < .05$) are depicted with solid arrows. Coefficients are standardized estimates for continuous predictors and partially standardized for dichotomous variables (i.e. organized and non-organized sports). The figure illustrates the model tested in the longitudinal path analysis.

Fig. 1. Analysis of Child Maltreatment, Sport Participation, Violence in Sports, and Psychological Adaptation. Note. Only significant predicting associations ($p < 0.05$) are depicted with solid arrows. Coefficients are standardized estimates for continuous predictors and partially standardized for dichotomous variables (i.e. organized and non-organized sports). The figure illustrates the model tested in the longitudinal path analysis.

Table 3
Direct effects predicting life satisfaction and internalized behaviors at Time 2.

Predictor (T1)	Life satisfaction (T2)		Internalized behaviors (T2)	
	β (SE)	p	β (SE)	p
Life satisfaction	0.483 (0.032)	< 0.001	–	
Internalized behaviors	–		0.578 (0.030)	< 0.001
Child maltreatment	–0.018 (0.056)	0.746	0.137 (0.055)	0.013
Organized sport participation	0.262 (0.073)	< 0.001	–0.184 (0.070)	0.009
Non-organized sport participation	0.209 (0.089)	0.018	–0.161 (0.087)	0.064
Violence in sport context	–0.095 (0.050)	0.058	–0.105 (0.047)	0.024
Organized sport $\times$ Child maltreatment	–0.134 (0.067)	0.044	–0.085 (0.066)	0.194

Note. Coefficients are standardized estimates for continuous predictors and partially standardized for dichotomous variables (i.e. organized and non-organized sports). T1 = Time 1; T2 = Time 2.

showed slightly stronger associations with psychological adaptation than non-organized sport participation. Another study that investigated participation in team sports during adolescence found that it was associated with better mental health in adulthood among those reporting higher levels of cumulative adverse childhood experiences (Easterlin et al., 2019). These findings might explain why a previous study (Asgeirsdottir et al., 2010; Asgeirsdottir & Sigfusdottir, 2021) did not

find a moderating association between sexual abuse and psychological outcomes, as the authors examined combined organized and non-organized sports in their analyses. The potential buffering effect of sport participation may therefore vary depending on the specific outcomes measured and the type of organized sport involved. Hence, future studies should be conducted to better understand the role of organized sport participation, for example, by distinguishing between team and individual sports.

In partial contrast with our hypotheses, the association between organized sport participation and psychological adaptation was conditional on CM only for life satisfaction. Specifically, organized sport participation was positively associated with life satisfaction at low to moderate levels of CM, but not at higher levels. For internalized symptoms, organized sport participation and CM were each independently associated with lower levels of symptoms. This pattern aligns with prior work suggesting that engagement in sport may be associated with better psychological adaptation among youth exposed to adversity (Romans et al., 1995; Holbrook et al., 2020), although these studies did not examine whether such associations vary according to the severity or cumulative nature of maltreatment.

Beyond these differences across outcomes, the absence of an association between organized sport participation and life satisfaction at higher levels of CM suggests limits to the potential benefits of sport participation under conditions of more severe adversity. A similar pattern has been reported in a study conducted among sexual and gender minority youth, which found that at higher levels of bullying, the relation between physical activity and depression/self-esteem was weaker than among non-bullied youth (Kirklewski et al., 2023). At elevated levels of maltreatment, it is plausible that the sport context may

Conditional effect of organized sport participation on life satisfaction across levels of child maltreatment (CM).

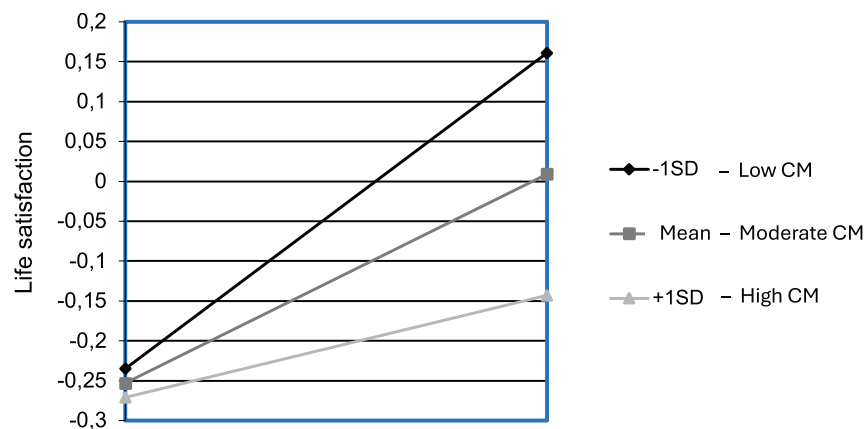


Fig. 2. Conditional effect of organized sport participation on life satisfaction across levels of child maltreatment (CM).

have less influence, as the severity of traumatic events could overshadow its potential benefits. Research clearly shows that, compared to a single event, cumulative trauma or the severity of maltreatment experienced is linked to a more complex constellation of symptoms, or a dose–response relation between the number of traumas and outcomes (Hamby et al., 2021). These symptoms may impair youths' ability to fully engage in, and benefit from the positive effects of sport participation. Consequently, these adolescents might require more intensive psychological care to manage their symptoms, either in parallel with or prior to joining an organized sport.

Beyond the level of maltreatment experienced, the nature of the sport environment itself also appears to play a key role. Notably, 55% of participants involved in organized sport reported experiencing violence within their sport context, challenging the assumption that sport is inherently protective. This is consistent with prior research showing that interpersonal violence occurs within sport settings (Pankowiak et al., 2023; Parent et al., 2019) and is associated with adverse outcomes (Daignault et al., 2023; Parent et al., 2022). Thus, our findings suggest that sport participation represents a heterogeneous developmental context in which potential benefits may be contingent upon the quality and safety of the environment. In this regard, accounting for violence in sports is critical for interpreting the observed variability in outcomes, as it may counteract the potential benefits of sport participation.

While no gender differences were observed in the associations between CM, sport participation, and psychological adaptation, mean-level differences were identified across several variables. Specifically, girls reported higher levels of internalized symptoms and lower life satisfaction compared to boys, whereas adolescents in the “other” gender category tended to report more adverse profiles overall; however, these estimates should be interpreted with caution given the small sample size of this subgroup. These findings suggest that although gender may be associated with differences in levels of exposure and adaptation, the underlying associations between CM, sport participation, and outcomes appear to operate similarly across genders. This pattern is partially consistent with prior research indicating gender differences in psychological outcomes following CM (Hagborg et al., 2017; Hahm et al., 2010), or in sport-related experiences (Slater and Tiggemann, 2011), although, contrary to Asgeirsdottir and Sigfusdottir (2021), we did not find stronger associations between CM and life satisfaction for girls than for boys. It should also be noted that, while the sample included participants identifying with other gender identities (e. g., nonbinary, gender fluid), the limited size of this subgroup precluded their inclusion in gender-based invariance analyses. Future research is needed to better understand whether these findings extend to gender-

diverse youth and generalize across different populations and contexts.

Taken together, these findings support an ecological interpretation whereby organized sport participation may function as a protective context only when it does not reproduce experiences of violence already encountered in other life domains. As our study was the first to examine varying levels of CM, future research should consider the trauma dose, that is, the cumulative burden of trauma. Similarly, future studies should also assess the sport dose, that is, the cumulative participation in sports activities.

4.3. Limitations and strengths

The findings of this study should be considered in light of its limitations. First, there was a moderate attrition rate between the first and second recruitment waves, a challenge also faced by many longitudinal studies conducted during the COVID-19 pandemic. Although the use of FIML to handle missing data reduces the risk of bias (Johnson & Young, 2011), results should be generalized with caution. Second, CM was not measured at T2, which may also have been a factor that exacerbated youths' psychological adaptation. Nonetheless, our study relied on self-reported CM measured at wave 1, which gave us access to diverse CM experiences encountered by adolescents, compared of CM reported to authorities (CPS, police records), which represent only a small proportion of real cases. Third, we only used two items to measure organized and non-organized sport participation. Other variables pertaining to the sport context could have influenced psychological adaptation, such as the type and level of sports practiced by adolescents, as well as the connection with others and enjoyment felt when practicing a sport. Future studies should consider these variables.

5. Conclusion

Overall, our findings suggest that organized sport participation is associated with life satisfaction among adolescents exposed to low to moderate levels of CM, pointing to its potential to support psychological adaptation. However, this potential benefit does not extend to adolescents exposed to more severe levels of maltreatment, highlighting limits to the protective role often attributed to sport participation. For these youth, integrating trauma-informed approaches and, when needed, concurrent psychological support may help maximize the potential benefits of sport participation.

Since it can be challenging to reach victims directly, integrating sport activities into child welfare services, particularly for adolescents in residential care, could be a promising avenue, as sport may serve as an

engaging and health-promoting entry point. This is an area that could be explored in future studies, as well as additional resilience factors (e.g., support from non-offending parents or other trusted adults), to further find ways to help victimized adolescents improve their well-being.

As sport participation was cross-sectionally and longitudinally associated with positive outcomes, the current results reiterate the importance of promoting sport participation and building a positive sport context, which should be especially relevant for teachers, coaches/instructors, social workers and other practitioners, as well as for policymakers. Importantly, however, the high prevalence of violence reported within sport contexts in this study underscores that organized sport cannot be assumed to be inherently protective. Rather, it represents a heterogeneous environment in which developmental outcomes may vary as a function of the presence or absence of violence. From an applied perspective, promoting sport participation alone is therefore insufficient: efforts must prioritize ensuring access to safe, supportive, and violence-free sport environments for all youth, particularly for those exposed to adversity.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.childyouth.2026.109024>.

Data availability

Data will be made available on request.

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