RESEARCH ARTICLE

DOI: 10.54392/ijpefs2621

International Journal of
PHYSICAL EDUCATION, FITNESS AND SPORTS

Perceived Sports Competence and Retrospective Physical Education Experiences in University Students: A Mixed-Methods Study

Motomu Haishima [a, *], Chieko Kato [b], Zihan Zhang [b]

[a] Graduate School of Information Sciences and Arts, Toyo University, Japan
[b] Faculty of Information Sciences and Arts, Toyo University, Japan
* Corresponding Author E-mail: s4b102110029@toyo.jp
DOI: https://doi.org/10.54392/ijpefs2621
Received: 06-01-2026; Revised: 07-03-2026; Accepted: 11-03-2026; Published: 23-03-2026

Abstract: School physical education experiences may shape later exercise engagement, yet how such experiences are cognitively organized in relation to perceived sports competence remains insufficiently understood. This study examined the associations between perceived sports competence and retrospective physical education experiences among Japanese university students using a mixed-methods design. Participants (N = 276) completed a retrospective questionnaire assessing perceived sports competence (PSPP-J short-form Sports Competence subscale), elementary and junior high school physical education experiences, and current exercise-related outcomes. Exploratory factor analysis supported a single-factor structure (eigenvalue = 2.84, variance explained = 61.87%), with good internal consistency (Cronbach's α = 0.86). Based on median scores, participants were classified into lower and higher competence groups. Quantitative analyses indicated that students with higher perceived competence reported more positive retrospective evaluations, greater comfort in physical education settings, and higher current exercise frequency. Qualitative text mining analyses further revealed systematic structural contrasts in narrative organization: higher competence narratives demonstrated greater integration of ability-related and affective elements, whereas lower competence narratives showed stronger clustering of evaluative and socially contextualized terms. Overall, the findings suggest that perceived sports competence is associated not only with exercise-related behaviors but also with differences in how physical education experiences are organized within retrospective accounts. These findings highlight the potential relevance of competence-supportive instructional contexts for understanding how physical education experiences may be remembered and interpreted later in life.

Keywords: Perceived Sports Competence, Physical Education, Retrospective Narrative, Text Mining, Exercise Engagement, Mixed-Methods.

1. Introduction

Regular participation in physical activity is widely recognized as an important contributor to physical health, psychological well-being, and overall quality of life (Warburton, and Bredin, 2017). Despite these well-established benefits, many individuals experience a gradual decline in exercise participation from adolescence into young adulthood. Previous studies have suggested that attitudes toward exercise, comfort in physical activity settings, and willingness to participate are shaped not only by current circumstances but also by earlier experiences in structured movement contexts, particularly school physical education classes (Cardinal, *et al.*, 2013 & Dumith *et al.*, 2011).

School physical education classes represent one of the earliest formal environments in which students are exposed to organized physical activity, evaluation, and social comparison. Within these classes, students repeatedly encounter situations that highlight differences in physical ability, performance, and social positioning. Such experiences may influence students' perceptions of their own physical competence and their emotional responses to movement-related tasks. For some students, physical education classes provide opportunities for enjoyment, confidence building, and

positive social recognition; for others they may be associated with anxiety, fear of failure, or avoidance of physical activity, particularly when instructional climates emphasize comparison or performance outcomes.

Perceived competence has been identified as a central psychological construct linking early movement experiences to later motivation and behavior in sport and exercise contexts. Early physical education experiences may therefore contribute to the development of perceived competence by repeatedly exposing students to evaluative, social, and performance-related contexts. Over time, these competence perceptions may become integrated into broader self-concept structures and influence motivational orientations toward physical activity. In this sense, perceived competence may function as a psychological mechanism through which early school-based movement experiences are translated into later engagement or avoidance patterns. According to competence motivation theory, individuals' beliefs about their ability to perform successfully influence affective responses, self-evaluations, and future engagement choices (Harter, 1982). Empirical research has consistently demonstrated that students with higher perceived competence report greater enjoyment, intrinsic motivation, and continued participation in physical activity, whereas students with lower perceived competence are more likely to experience negative emotions and disengagement (Standage, (2005), Weiss, (2002); Babic *et al.,* 2014) Recent research has continued to highlight motivation and perceived competence as key determinants of sustained participation in physical activity across adolescence and young adulthood (Babic *et al*., 2014; Ntoumanis, 2009)

The Physical Self-Perception Profile (PSPP) provides a domain-specific framework for understanding physical self-perceptions, including sports competence, physical condition, and physical self-worth (Fox, & Corbin, 1989). The Japanese version of the PSPP has demonstrated acceptable reliability and validity among student samples and has been widely used to examine physical self-perception in Japanese contexts (Uchida, 2003). Within this framework, sports competence reflects individuals' perceived ability and confidence in sport and physical activity situations and is particularly relevant in research examining physical education experiences and exercise behavior.

Few studies have examined how such competence perceptions are structurally reflected in retrospective narrative organization. While quantitative approaches are effective for identifying general trends and associations, they may not fully capture how individuals interpret and narratively construct their own physical education experiences. In particular, less attention has been paid to how university students retrospectively describe their school physical education experiences and how these memories are integrated into their current exercise-related attitudes. Retrospective reflections may provide insight into how past experiences are cognitively and emotionally integrated into the developing self-concept during young adulthood. Recent studies have also emphasized that remembered physical education experiences may influence later attitudes toward sport participation and physical activity engagement (Subramaniam, 2007; Cairney, 2012; Beni 2017; Fletcher & Ní Chróinín, 2022).

Qualitative approaches, including the analysis of open-ended responses, allow participants to express nuanced perceptions related to emotional safety, social comparison, instructional support, and personal coping strategies. Such perspectives may be especially important for understanding the experiences of individuals with lower perceived competence, whose voices may be underrepresented in standardized scales alone (Horn, 2008). Retrospective open-ended responses allow participants to reflect on how earlier physical education experiences are subjectively remembered and emotionally interpreted over time, which is difficult to capture through standardized measures alone. Integrating qualitative descriptions with quantitative indicators may therefore provide a more comprehensive understanding of how physical education experiences are meaningfully structured in memory and linked to present exercise behavior.

Given these considerations, the present study adopted a mixed-methods design combining quantitative group comparisons and qualitative text-based analysis. Recent research has further highlighted the role of perceived competence, motivational climate, and emotional experiences in shaping long-term physical activity engagement among adolescents and young adults (Ntoumanis *et al.,* 2021; Owen *et al.,* 2022; Vasconcellos *et al.,* 2020). In particular, competence-supportive environments and positive affective experiences in physical education have been associated with more adaptive motivational patterns and sustained participation in physical activity over time. However, limited research has examined how such experiences are structurally organized in retrospective narratives. The present study contributes to the literature in three ways. First, it focuses on the retrospective organization of physical education

experiences rather than solely on contemporaneous motivation or competence perceptions. Second, it integrates quantitative comparisons with text-mining analysis of narrative responses, allowing examination of both behavioral patterns and structural features of autobiographical recall. Third, by applying co-occurrence network analysis to students' descriptions of past physical education experiences, the study provides a structural perspective on how competence-related memories may be organized in narrative form.

Based on this framework, the purpose of this study was to examine how perceived sports competence relates to Japanese university students' retrospective perceptions of school physical education experiences and their perceived influence on current exercise-related attitudes. Specifically, this study aimed to (a) compare exercise frequency and attitudes between students with lower and higher perceived sports competence and (b) explore structural differences in narrative patterns within students' retrospective descriptions of physical education experiences and their perceived long-term influence. It was hypothesized that differences in perceived sports competence would be reflected not only in quantitative indicators of exercise behavior, but also in the way past physical education experiences are narratively organized and emotionally integrated.

2. Methods

2.1. Design and Participants

A cross-sectional questionnaire-based study was conducted to examine associations between perceived sports competence, retrospective physical education experiences, and current exercise-related behaviors among university students. Participants were undergraduate students aged 18 years or older enrolled at a private university in Japan. Data were collected in January 2026 using a paper-based, self-administered questionnaire distributed during class time. Participation was entirely voluntary, and students were informed that their responses would be used for research purposes only and that non-participation would not result in any academic disadvantage.

A total of 280 questionnaires were returned. Of these, four students did not provide consent to participate in the study and were therefore excluded from the analysis. The final analytic sample consisted of 276 valid responses, yielding a valid response rate of 98.6%. All responses were anonymized prior to analysis, and no personally identifiable information was collected.

2.2. Measure of Perceived Sports Competence

Perceived sports competence was assessed using the Sports Competence subscale of the Japanese version of the Physical Self-Perception Profile short form (PSPP-J; 20 items), which was provided by Dr. Wakaki Uchida. The PSPP-J is a validated instrument designed to assess domain-specific perceptions of the physical self among Japanese populations. The Sports Competence subscale consists of four items that evaluate individuals' perceived ability, confidence, and self-evaluation in sport and physical activity contexts (Uchida, *et al.*, 2003).

Each item was rated on a 4-point Likert-type scale ranging from 1 to 4. Among the four items, three items (items 1, 3, and 4) were negatively worded and were reverse-scored using the transformation (5−raw score), so that higher scores consistently reflected higher perceived sports competence. The subscale score was calculated as the mean of the four items.

Exploratory factor analysis and internal consistency were assessed in the present sample as a sample-specific check of internal structure and reliability rather than as a formal validation of the scale.

2.3. Group Classification

To facilitate group-based comparisons, the mean score of the four-item Sports Competence subscale was calculated for each participant. The median of these individual mean scores was computed across the full sample. Participants were classified into lower and higher perceived sports competence groups based on whether their individual mean score was equal to or below, or above, the sample median. This median split approach was adopted to facilitate structural comparison of narrative configurations between distinct competence levels. Because the qualitative text-mining analysis aimed to compare group-level narrative structures through co-occurrence networks, a categorical grouping strategy allowed clearer visualization and interpretation of structural differences in narrative organization.

2.4. Data Analysis

2.4.1. Quantitative Analysis

Quantitative analyses were conducted using IBM SPSS Statistics (Version 29). Exploratory factor

analysis was performed using the principal factor method to examine the factor structure of the Sports Competence subscale. Because the PSPP-J is an established instrument, the analysis was conducted only as a sample-specific check of unidimensionality in the present dataset rather than as a formal scale validation procedure. Given the small number of items (four), the factor-analytic results should be interpreted as supporting the internal coherence of the subscale within the present sample rather than establishing a new factor structure. Internal consistency was evaluated using Cronbach's alpha.

Descriptive statistics were calculated for all study variables. Group differences between lower and higher perceived sports competence groups were examined using Mann–Whitney U tests due to the ordinal nature of several variables. Effect sizes were calculated using r. The significance level was set at $p < .05$.

2.4.2. Qualitative Analysis of Open-ended Responses

Open-ended responses regarding elementary school physical education experiences, junior high school physical education experiences, and their perceived long-term influence on current exercise attitudes were analyzed using KH-Coder (Higuchi, 2017), a text-mining software for quantitative content analysis. KH-Coder was selected because it enables systematic identification of co-occurrence relationships among frequently appearing terms, allowing examination of structural patterns in narrative data that may not be easily captured through conventional coding-based qualitative approaches.

Morphological analysis was conducted using the built-in Japanese tokenizer. Words with a minimum frequency of five occurrences were extracted. Nouns, adjectival nouns, and selected adjectives were included to capture behavioral and affective expressions. For each question, the top 20 most frequent words were identified to facilitate group-based comparison of salient lexical markers.

Rather than examining isolated word frequencies alone, the qualitative analysis aimed to identify recurrent structural markers distinguishing lower and higher perceived sports competence groups. Co-occurrence networks were generated using the Jaccard coefficient to examine structural relationships among frequently appearing words. Network interpretation focused on structural indicators including central nodes, cluster density, and relational proximity among competence-related terms. Structural configurations were interpreted by examining how competence-related words were connected to affective, instructional, or social evaluation terms within the network in order to evaluate differences in structural organization between groups.

Perceived sports competence group was entered as an external variable (coded as 1 = lower group, 2 = higher group), and co-occurrence networks were generated separately for each question to compare group-level narrative configurations. The analysis emphasized structural tendencies at the group level rather than individual-level interpretation.

2.5. Ethics Approval and Consent to Participate

This study was reviewed and approved by the Research Ethics Committee of the Graduate School of Information Sciences and Arts, Toyo University (Approval No. 2025-39). All participants provided written informed consent prior to participation. Participation was voluntary and responses were collected anonymously.

3. Results and Discussion

3.1. Participant Characteristics and Psychometric Properties

The final analytic sample consisted of 276 university students, including 210 males, 65 females, and one participant who preferred not to report gender. Participants ranged in age from 18 to 26 years ($M = 20.17$, $SD = 1.22$). Academic year distribution indicated that most participants were in their first to third years of study, with 66 first-year students, 121 second-year students, 75 third-year students, 12 fourth-year students, and two fifth-year students.

Prior to conducting group-based comparisons, the psychometric properties of the perceived sports competence scale were examined to ensure the appropriateness of subsequent classification procedures.

Exploratory factor analysis was conducted on the four-item Sports Competence subscale using principal axis factoring. The Kaiser–Meyer–Olkin measure of sampling adequacy was 0.812, and Bartlett's test of sphericity was significant (χ^2 (6) = 519.275, $p < .001$), indicating suitability for factor analysis.

Table 1. Exploratory Factor Analysis of the Sports Competence Subscale (N = 276)

Item	Item Content	Factor Loading	Communality (h^2)
1*	I often feel that I am not very good at sports.	0.887	0.787
2	When I participate in sports activities, I usually feel that I am among the more skilled participants.	0.724	0.524
3*	I do not feel confident about my athletic ability.	0.772	0.597
4*	Compared to others, I sometimes feel that my sports ability is not very high.	0.753	0.568

Eigenvalue = 2.84

Variance Explained = 61.87%

Note. Extraction method: Principal axis factoring. KMO = .812; Bartlett's test of sphericity: χ^2 (6) = 519.28, p < .001; Cronbach's **α**= .864.

*Items marked with an asterisk were reverse-scored prior to analysis so that higher scores consistently reflected higher perceived sports competence.

One factor was extracted with an eigenvalue of 2.844, accounting for 61.87% of the variance. All items loaded strongly on the single factor (factor loadings ranged from .724 to .887). All factor loadings exceeded .70, indicating strong item-factor associations. Internal consistency was good (Cronbach's α = 0.86), indicating acceptable internal consistency of the perceived sports competence subscale in the present sample (Table 1).

Perceived sports competence scores ranged from 1.00 to 4.00 (M = 2.60, SD = 0.81). The median score was 3.00.

Based on this median value, participants were classified into a lower perceived sports competence group (≤ 3.00; n = 180) and a higher perceived sports competence group (≥3.25; n = 96). This classification enabled subsequent comparisons of retrospective physical education experiences and narrative structures across competence levels. This median-split procedure was adopted to distinguish participants with relatively lower versus higher perceived sports competence, enabling subsequent examination of whether competence level functions as a differentiating psychological variable in both quantitative outcomes and narrative representations.

3.2. Quantitative Results: Group Differences in Retrospective Physical Education Experiences and Current Exercise Behavior

To address the first research aim, group differences were examined using perceived sports competence as the grouping variable (Table 2). Specifically, retrospective physical education experiences and current exercise behavior were compared between lower and higher competence groups. In addition to reporting medians and nonparametric test results, descriptive statistics for the key variables were also examined to provide a clearer overview of the distribution patterns within each group.

3.2.1. Current Exercise Frequency

Students in the higher perceived sports competence group reported significantly higher exercise frequency outside formal classes compared with those in the lower competence group. The median exercise frequency was four (1–6 scale) in the higher group and one in the lower group (U = 6925, p = .006, r = .17), indicating a small effect size.

3.2.2. Retrospective Enjoyment of Physical Education

Regarding enjoyment of elementary school physical education classes, the higher competence group reported significantly greater liking (median = 5) compared with the lower competence group (median = 4) on a five-point scale (U = 6909, p = .001, r = .19).

Similar differences were observed for junior high school physical education classes, with the higher competence group again reporting more positive evaluations (median = 5) than the lower competence group (median = 4) (U = 6401.5, p < .001, r = .23).

3.2.3. Self-Evaluated Physical Competence during School Years

Differences in retrospective self-evaluated physical competence were more pronounced.

Table 2. Group Differences in Retrospective Physical Education Experiences and Current Exercise Frequency

Variable	Lower PSC group (n = 180)	Higher PSC group (n = 96)	U	p-value	Effect size (r)	Mean	SD
Current exercise frequency (1–6)	1	4	6925	.006	0.17	3.61	1.85
Liking PE in elementary school (1–5)	4	5	6909	.001	0.19	4.18	1.28
Perceived competence in elementary school (0–10)	6	9	4756.5	< .001	0.37	6.88	2.68
Liking PE in junior high school (1–5)	4	5	6401.5	< .001	0.23	4.02	1.31
Perceived competence in junior high school (0–10)	6	9	4844	< .001	0.36	6.66	2.67
Comfort in PE classes (1–5)	4	5	5939.5	< .001	0.27	3.95	

Note. Values for group columns are presented as medians (Mdn).
PSC = perceived sports competence.
Group differences were examined using Mann–Whitney U tests.
Effect sizes are reported as r.
For perceived competence in junior high school, the valid sample size was 275 due to one missing response in the lower PSC group.

In elementary school, median ratings were nine (higher group) versus six (lower group) on a ten-point scale (U = 4756.5, p < .001, r = .37). A similar pattern was observed for junior high school (median = 9 vs. 6; U = 4844, p < .001, r = .36). These findings reflect small-to-moderate effect sizes.

3.2.4. Comfort in Physical Education Settings

Students with higher perceived sports competence reported greater comfort during physical education classes (median = 5) compared with those in the lower competence group (median = 4) (U = 5939.5, p < .001, r = .27), indicating a small-to-moderate effect.

Taken together, these quantitative findings indicate that perceived sports competence functions as a meaningful differentiating variable associated with both retrospective evaluations of physical education experiences and current exercise engagement, with effect sizes ranging from small to moderate.

3.3 Qualitative Text Mining Results: Structural Group Comparisons

To move beyond simple word frequency comparisons and to identify systematic differences in narrative organization, the qualitative analyses were conducted with an explicit focus on group-level structural contrasts. Rather than interpreting isolated lexical occurrences, the analysis aimed to identify recurrent narrative markers that distinguished students with higher versus lower perceived sports competence. For each question, two complementary steps were undertaken: first, high-frequency lexical items were compared across groups to identify salient thematic contrasts; second, co-occurrence network analyses were examined to determine how these terms were structurally organized within each group's narrative configuration. This approach allowed the identification of integrated versus socially mediated narrative patterns across developmental stages. The results are presented sequentially for elementary school experiences, junior high school experiences, and perceived long-term influence, with particular emphasis on structural markers that differentiate the two competence groups. The quotations presented below are provided as representative examples illustrating the dominant narrative patterns identified in the co-occurrence networks.

3.3.1 Elementary School Physical Education Experiences: Structural Contrasts between Groups

Two structural contrasts emerged in the analysis of elementary school physical education

narratives. First, the higher perceived competence group displayed an integrated competence-centered structure in which ability-related markers were closely aligned with positive affect and engagement. Second, the lower perceived competence group exhibited a socially anchored and segmented structure in which ability evaluation was more tightly coupled with social positioning and negative evaluative episodes.

3.3.1.1 Ability–Affect Integration in the Higher Competence Group

In the higher competence group, competence-related markers occupied structurally central positions within the network configuration (Table 3). As illustrated in Figure 1b, physical activity functioned as a central hub directly connected with competence, low competence, self, and social surroundings, forming a cohesive evaluative core. Around this core, several coherent substructures were evident. An affect–engagement cluster linked liking with positivity and participation, suggesting that positive stance toward activity was structurally embedded within active involvement. A teaching-context cluster connected teacher, frequent occurrence, and sport, indicating that instructional exposure was integrated into competence narratives. In addition, an ability chain linking ability, high and friends reflected explicit evaluation of skill level in relation to others. Although failure and embarrassment appeared as a connected pair, they did not occupy a central structural position within the network, suggesting that negative episodes were represented but not dominant. Representative responses further reflected this integrated organization. One participant stated: "I believed I was good at physical activity, and when others praised me, I felt happy. Since then, I have recognized myself as being competent in sports"（当時は運動が得意だと思っていた。みんなから褒められて嬉しかった。それ以来、自分は運動が得意なのだと認識している。）.

Table 3. Top 20 Extracted Words by Frequency in Free Response Data Across Lower and Higher Perceived Sports Competence Groups: Elementary School Physical Education Experiences

Rank	Low	Freq	High	Freq
1	physical activity	103	physical activity	152
2	competence	71	competence	129
3	low competence	61	low competence	90
4	ordinariness	42	social surroundings	53
5	social surroundings	40	ordinariness	47
6	self	28	self	36
7	physical education	19	physical education	31
8	happiness	17	happiness	26
9	confidence	14	teacher	24
10	enjoyment	13	frequent occurrence	20
11	frequent occurrence	12	enjoyment	18
12	specific sport	12	sport	17
13	teacher	11	confidence	17
14	swimming	11	liking	17
15	liking	10	team	14
16	soccer	10	ball games	14
17	sport	10	specific sport	13
18	embarrassment	9	embarrassment	13

19	treatment	9	failure	12
20	team	9	feeling	12

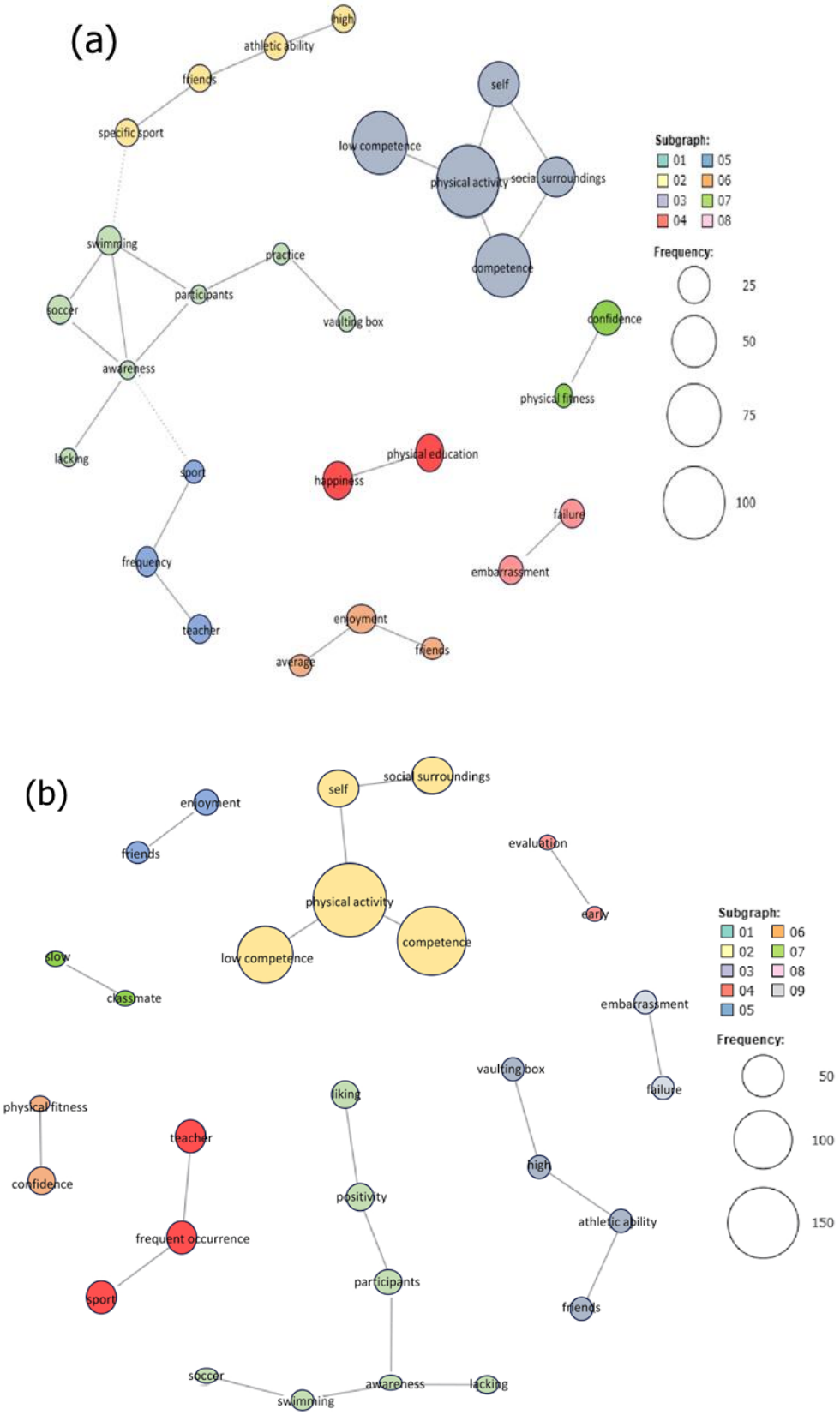

Figure 1.(a) Co-occurrence Networks for Elementary School Physical Education Experiences: Lower Perceived Sports Competence Group, **(b)** Co-occurrence Networks for Elementary School Physical Education Experiences: Higher Perceived Sports Competence Group**.**

3.3.1.2 Socially Anchored Segmentation in the Lower Competence Group

In contrast, the lower competence group demonstrated a more segmented configuration (Table 4). Figure 1a, physical activity formed a central cluster linking low competence, competence, self, and social surroundings. Beyond this compact core, the network fragmented into multiple relatively independent clusters. Failure and embarrassment formed a tightly connected pair, suggesting that negative evaluative experiences were remembered as a coupled unit. A separate cluster linked enjoyment with friends and average, indicating that positive affect was more often framed in terms of peer context and ordinariness rather than mastery. Another cluster connected sport, frequent occurrence, and teacher, but this instructional context was not integrated into the central competence structure in the same way observed in the higher competence group. Representative responses reflected this socially mediated pattern. One participant stated: "I felt I was not good at sports, and I was always conscious of others' eyes. I tried not to stand out after feeling embarrassed"（運動が苦手だと感じていて、周囲の目が気になった。恥ずかしい思いをしてからは目立たないようにしていた。）.

3.3.2 Junior High School Physical Education Experiences: Structural Contrasts between Groups

Two structural contrasts emerged in the analysis of junior high school physical education narratives. First, the higher perceived competence group demonstrated a competence-centered configuration in which perceived ability functioned as an organizing hub linking self-evaluation and affective response. Second, the lower perceived competence group exhibited a socially contextualized configuration in which ordinariness, social surroundings, and evaluative episodes were more structurally prominent.

Table 4. Top 20 Extracted Words by Frequency in Free Response Data Across Lower and Higher Perceived Sports Competence Groups: Junior High School Physical Education Experiences

Rank	Low	Freq	High	Freq
1	physical activity	76	competence	53
2	competence	65	physical activity	36
3	low competence	54	low competence	17
4	self	53	self	17
5	ordinariness	49	physical education	15
6	social surroundings	31	enjoyment	11
7	junior high school	26	social surroundings	9
8	club activity	24	happiness	8
9	physical education	22	junior high school	8
10	elementary school	18	frequent occurrence	7
11	enjoyment	17	ordinariness	7
12	frequent occurrence	17	club activity	7
13	mistake	12	mistake	6
14	liking	10	skillfulness	5
15	academic performance	9	teacher	5
16	treatment	9	lesson	5
17	competition	9	fear	5
18	practice	8	team	4

19	teacher	8	sport	4
20	positivity	8	confidence	4

3.3.2.1 Competence-Centered Integration in the Higher Competence Group

In the higher competence group, competence functioned as a structurally central node within the network configuration (Table 4). As illustrated in Figure 2b, competence was closely connected with physical activity and indirectly linked with self and junior high school, forming the core of the narrative structure. Physical activity served as a bridging node connecting competence-related markers with feeling-related expressions. While enjoyment and happiness appeared in the network, they were embedded within the broader competence-centered structure rather than forming independent clusters. Representative responses reflected this configuration. One participant stated: "I felt I was good at sports in junior high school, and that made physical education enjoyable" (「中学では運動が得意だと感じていて、体育は楽しかった。」).

3.3.2.2 Social Contextual Emphasis in the Lower Competence Group

In contrast, the lower competence group showed a different narrative organization. As illustrated in Figure 2a, physical activity formed a central cluster linking low competence, competence, self, and ordinariness. Unlike the higher competence group, ordinariness occupied a visible position within the central cluster. Evaluative markers such as mistakes and social awareness appeared in adjacent substructures rather than being integrated within a competence-centered hub. Representative responses illustrate this pattern. One participant stated: "In junior high school, I felt I was just average in sports and tried not to stand out in physical education class." (「中学の体育の授業では自分は運動が普通だと感じていて、目立たないようにしていた。」).

3.3.3 Perceived Long-Term Influence of Physical Education Experiences: Structural Contrasts Between Groups

Two structural contrasts emerged in narratives concerning the perceived long-term influence of physical education experiences. First, the higher perceived competence group demonstrated a self-referential integration in which physical activity experiences were organized around continued engagement and self-confidence. Second, the lower perceived competence group exhibited a persistence-oriented configuration in which past experiences were structurally linked to low competence and contextual influence.

3.3.3.1 Self-Referential Integration in the Higher Competence Group

In the higher competence group, physical activity functioned as the central organizing node within the network configuration (Table 5). As illustrated in Figure 3b, physical activity was closely connected with self and experience, forming an integrated structure linking past participation with present self-evaluation. Positive affective expressions such as enjoyment were embedded within this broader experiential structure. Representative responses reflected this organization. One participant stated: "Because of my experiences in physical education and sports during elementary and junior high school, I became more confident in myself." (「小中学校の体育やスポーツの経験を通して、自分に自信を持てるようになった。」).

3.3.3.2 Persistence of Evaluative Framing in the Lower Competence Group

In contrast, the lower competence group displayed a more segmented configuration. As illustrated in Figure 3a, physical activity was linked with experience and self, forming a central triadic structure. However, low competence remained closely connected with awareness and evaluative markers, indicating continued sensitivity shaped by earlier experiences. Representative responses illustrate this configuration. One participant stated: "I still strongly feel that I do not want to do the physical education activities I was not good at in elementary and junior high school" (「小中学校の体育で苦手だった種目は、今でもあまりやりたくないと感じる。」). The structural contrasts identified across the three narrative domains are summarized in Table 6.

4. Discussion

The present study examined whether perceived sports competence was associated not only with quantitative differences in retrospective evaluation and current exercise engagement, but also with qualitative

differences in how physical education experiences were organized within students' narratives. The findings suggest that perceived competence is reflected at both behavioral and structural levels. Importantly, beyond differences in reported enjoyment or participation frequency, the qualitative analyses indicate systematic contrasts in the configuration of competence-related memories.

4.1 Quantitative Associations and Behavioral Patterns

Consistent with the study hypothesis, students with higher perceived sports competence reported more positive retrospective evaluations of physical education, greater comfort within physical education settings, and higher current exercise frequency. These findings are broadly aligned with competence motivation theory [4], which proposes that perceived ability is associated with affective responses and behavioral engagement.

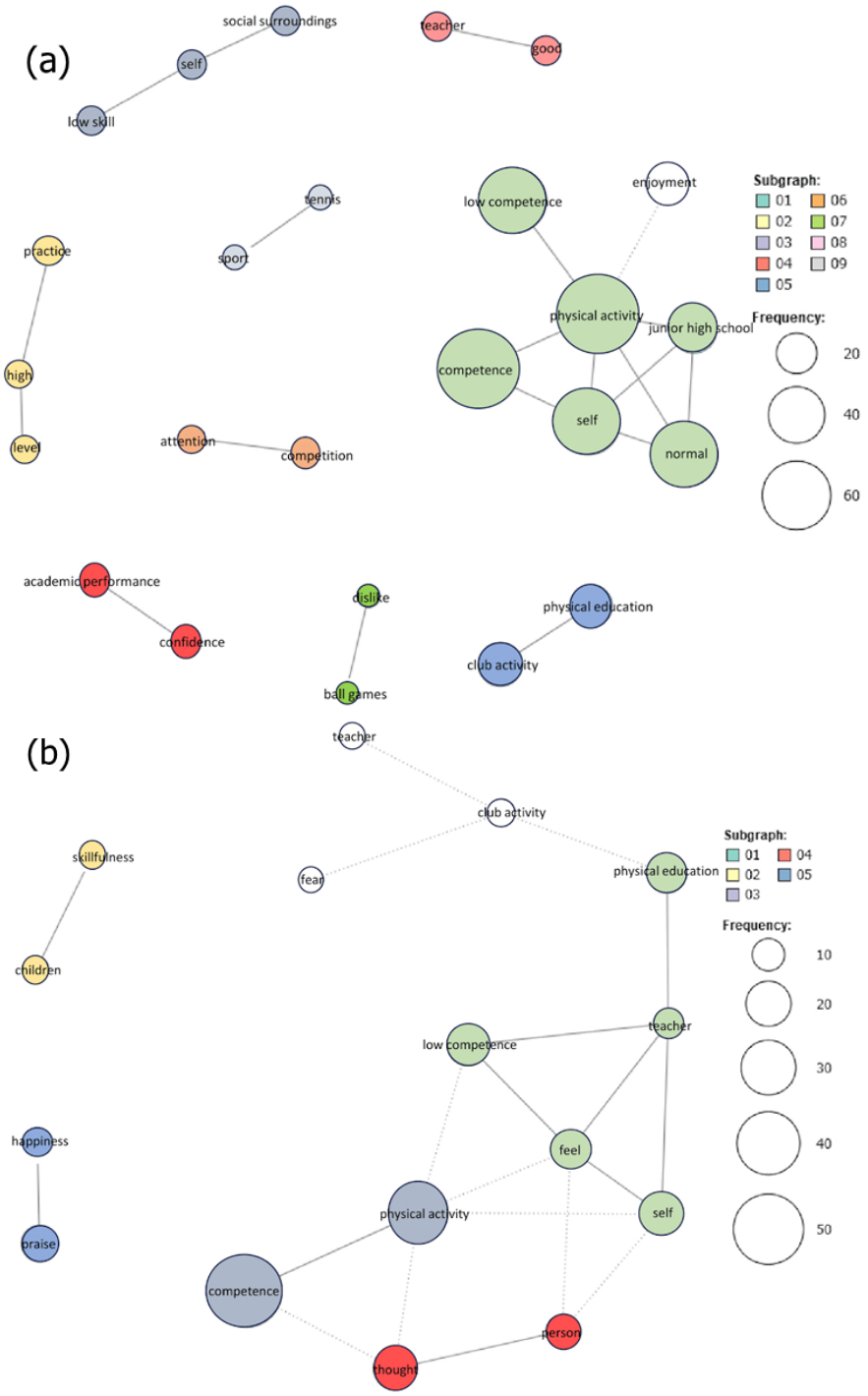

Figure 2. **(a)** Co-occurrence Networks for Junior High School Physical Education Experiences: Lower Perceived Sports Competence Group, **(b)** Co-occurrence Networks for Junior High School Physical Education Experiences: Higher Perceived Sports Competence Group

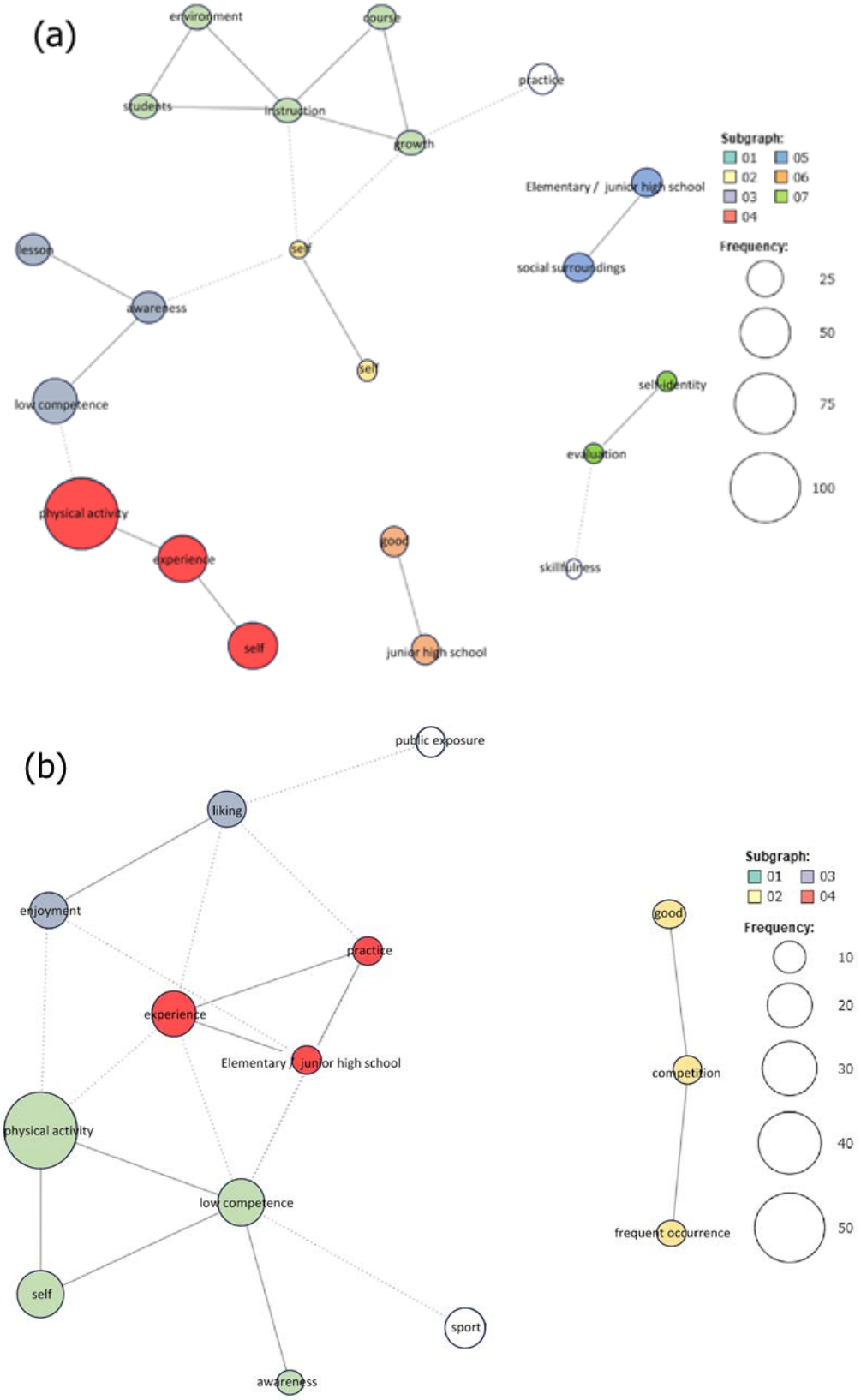

Figure 3. **(a)** Co-occurrence Network for Perceived Long-Term Influence of Physical Education Experiences: Lower Perceived Sports Competence Group, **(b)** Co-occurrence Network for Perceived Long-Term Influence of Physical Education Experiences: Higher Perceived Sports Competence Group

Table 5. Top 20 Extracted Words by Frequency in Free Response Data Across Lower and Higher Perceived Sports Competence Groups: Perceived Long-Term Influence of Physical Education Experiences

Rank	Low	Freq	High	Freq
1	physical activity	107	physical activity	56
2	self	42	low competence	19
3	experience	41	experience	18
4	low competence	37	self	18
5	influence	23	sport	16
6	liking	20	self-confidence	11
7	failure	19	enjoyment	10
8	sport	19	public exposure	9
9	enjoyment	17	competence	9
10	competence	17	liking	8
11	junior high school	17	awareness	5
12	elementary and junior high school	16	practice	5
13	social surroundings	14	competition	5
14	physical education	14	frequent occurrence	5
15	good	13	good	5
16	environment	11	elementary and junior high school	5
17	public exposure	10	feeling	4
18	elementary school	9	sport	4
19	self-confidence	9	self-identity	4
20	awareness	9	failure	4

Table 6. Structural Difference in Narrative Organization Between Competence Groups

Domain	Higher perceived competence group	Lower perceived competence group
Elementary school PE experiences	Narratives integrated competence evaluation with positive affect and active engagement in physical activity.	Narratives emphasized social awareness, embarrassment, and avoidance of attention during physical education.
Junior high school PE experiences	Competence functioned as the central organizing marker linking ability evaluation and positive affect.	Ordinariness and social comparison appeared more prominently in the narrative structure.
Perceived long-term influence	Past PE experiences were associated with continued engagement in sport and self-confidence.	Past PE experiences were more often linked to persistent awareness of low competence and heightened evaluative sensitivity.

Previous research has similarly demonstrated positive associations between perceived competence, enjoyment, and sustained physical activity participation (Standage *et al.*, 2005; Babic *et al.,* 2014).

However, while these quantitative differences confirm established relationships between competence perception and engagement, they do not fully explain how past experiences are remembered and reconstructed. The qualitative findings extend these associations by indicating that competence perception may also be reflected in the structural organization of retrospective accounts. Thus, perceived sports competence appears to relate not only to what students report feeling or doing, but also to how they organize and integrate their physical education experiences.

4.2 Structural Organization of Retrospective Narratives

Across educational stages, two recurring structural tendencies emerged. Students with higher perceived competence demonstrated relatively integrated narrative configurations, in which ability-related experiences were closely linked with positive affect and instructional recognition. In contrast, students with lower perceived competence showed more socially anchored and segmented configurations, in which competence evaluation was more tightly connected to social awareness, public exposure, and evaluative episodes.

Importantly, these differences were not reducible to simple emotional valence. Rather than merely using more negative expressions, the lower competence group tended to embed competence-related terms within clusters involving social surroundings and evaluation. For example, statements such as "I tried not to stand out during physical education classes" or "I was afraid of making mistakes in sports" illustrate how competence was framed in relation to peer visibility and performance anxiety. In contrast, higher competence narratives often integrated recognition and enjoyment within the same structural cluster, as reflected in responses such as "Being praised in physical education classes strengthened my confidence" or "Since I was good at sports, PE was always enjoyable."

These patterns suggest that perceived sports competence may be associated with differences in how physical education experiences are cognitively organized and retrospectively reconstructed. In the higher group, competence, enjoyment, and recognition tended to form a cohesive configuration. In the lower group, competence evaluation appeared more closely intertwined with social positioning and evaluative context.

4.3 Developmental Continuity across Educational Stages

Notably, these structural contrasts were observed consistently across elementary school experiences, junior high school experiences, and perceived long-term influence. Although the specific lexical markers varied by developmental stage, the underlying configuration pattern remained relatively stable.

In earlier stages, higher competence narratives tended to integrate ability recognition and positive engagement within instructional contexts. In later reflections on long-term influence, this integration was often extended to self-confidence and continued involvement in physical activity, as reflected in statements such as "Even now, sports are still enjoyable, and I want to stay involved." Conversely, lower competence narratives consistently emphasized evaluative exposure and contextual factors, and long-term reflections sometimes retained avoidance-oriented themes, as illustrated by responses such as "Even now, I still do not want to participate in the activities I was not good at in physical education."

This continuity suggests that competence-related experiences may be reflected in relatively stable narrative patterns across recalled educational stages. While the present cross-sectional design does not permit causal inference, the findings raise the possibility that early instructional and evaluative experiences may be associated with enduring ways of interpreting and integrating physical education memories.

4.4 Theoretical and Educational Implications

The present findings complement existing research on competence motivation and self-concept development (Harter, 1982; Weiss 2002) by suggesting that perceived competence may be reflected not only in behavioral engagement and affective outcomes, but also in the structural organization of autobiographical recall. In this sense, perceived competence may act as a psychological mechanism linking early school-based movement experiences to later engagement or avoidance of physical activity. These findings are consistent with the relevance of competence-supportive instructional contexts.

From an educational perspective, these results may underscore the importance of instructional climates that reduce excessive evaluative salience and support adaptive competence development. Mastery-oriented feedback, opportunities for individualized progress, and psychologically safe learning environments may be associated with not only immediate motivation but also how physical education experiences are later remembered and integrated. Although the present study cannot establish causality, the structural differences observed here are consistent with motivational climate research suggesting that evaluative contexts shape affective and behavioral responses (Weiss, 2017; Ntoumanis, 1999).

4.5 Limitations and Future Directions

Several limitations should be acknowledged. The retrospective and cross-sectional design may involve recall bias and does not allow determination of directional effects. The qualitative analyses reflect group-level structural tendencies rather than individual developmental trajectories. In addition, the sample was limited to one university context in Japan, which may restrict generalizability. The gender composition of the sample was also unbalanced, with a substantially larger proportion of male participants, which may have influenced the observed patterns. Previous research has suggested that gender differences may exist in attitudes toward physical education, perceived competence, and exercise behavior. Furthermore, although the participants were university students within a relatively narrow age range, differences in academic year may also be associated with variations in exercise habits or retrospective evaluations of physical education experiences. Future longitudinal research may clarify how perceived competence develops over time and how instructional environments contribute to the integration of competence-related experiences. Further investigation using mixed-method designs may also deepen understanding of how narrative organization relates to sustained engagement in physical activity. Future studies may also benefit from examining more demographically balanced samples and considering gender and academic year as potential covariates.

5. Conclusion

The present study indicates that perceived sports competence is associated not only with quantitative differences in retrospective evaluation and current exercise engagement, but also with systematic contrasts in the structural organization of physical education narratives. Across developmental stages, students with higher and lower perceived competence demonstrated distinct patterns in how competence-related experiences were integrated with affective and contextual elements.

These findings suggest that perceived sports competence may be reflected not only in behavioral participation, but also in the way physical education experiences are organized and incorporated into self-perceptions over time. Understanding these structural patterns may contribute to a more comprehensive perspective on how physical education experiences are remembered and interpreted over time. Further longitudinal research is needed to clarify the developmental mechanisms underlying these associations.

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Author Contribution Statement

Motomu Haishima: Conceptualization, Methodology, Investigation, Formal analysis, Writing – original draft, Writing – review & editing. Chieko Kato: Methodology, Investigation, Validation, Visualization, Writing – review & editing. Zihan Zhang: Methodology, Investigation, Validation, Visualization, Writing – review & editing. All authors have read and approved the final version of the manuscript.

Data Availability

Data collected during the study will be made available from the corresponding author upon reasonable request.

Informed Consent

Written consent was obtained from all the participants before the commencement of the study.

Ethics Approval Statement

This study was reviewed and approved by the Research Ethics Committee of the Graduate School of Information Sciences and Arts, Toyo University (Approval No. 2025-39).

Acknowledgments

The authors thank all participants and the instructors who facilitated data collection.

Funding Source

This study received no external funding.

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Yes

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