Factor Validity and Reliability of the Sport Friendship Quality Scale in a French adolescent sample

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1   Running head: SPORT FRIENDSHIP QUALITY SCALE FRENCH VERSION

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1   Abstract

2   The main aim of the present series of studies was to test the factor validity and

3   reliability of the Sport Friendship Quality Scale (SFQS; Weiss & Smith, 1999) in a French

4   adolescent sample. Four studies, involving a total sample of 589 participants, were performed

5   in order to translate items from the SFQS into French (SFQS-FR) and evaluate their clarity

6   (Study 1) and to assess (a) the concurrent validity (Study 2), (b) the factor validity and

7   reliability (Study 3), and (c) the temporal stability (Study 4) of the SFQS-FR. Study 1

8   provided support for the item content of the preliminary version of the SFQS-FR for

9   adolescents. Study 2 supported the convergent validity of both the SFQS and SFQS-FR.

10   Finally, Studies 3 and 4 provided (a) support for the factorial structure and reliability (i.e.,

11   internal consistency and temporal stability) of a seven-factor model of the SFQS-FR, (b)

12   partial support for the factorial invariance for the aforementioned model across gender and

13   age, and (c) support and partial support for the latent mean invariance of the seven-factor

14   model across age and gender, respectively. The present results thus provide preliminary

15   evidence of the appropriateness of the SFQS-FR for adolescents. Nevertheless, further

16   evaluation of this instrument is warranted to establish the robustness of the present findings.

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18   Key-Words: Friendship quality, peer relationships, adolescence, invariance, validation.

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3   The peer experiences of children and adolescents have been considered on three levels

4   of social complexity in psychosocial literature (Hinde, 1987; Rubin, Bukowski, & 2006):

5   interactions, relationships, and groups. Interactions are the simplest order of complexity and

6   refer to a social exchange of some duration between two individuals. Then, relationships

7   introduce a higher order of complexity to youth experiences with peers as this into account

8   the meanings, expectations, and emotions stemming from several interactions between

9   individuals (Rubin et al., 2006). This level thus includes privileged dyadic relations and the

10 concept of friendship. Finally, groups have been defined as collections of interacting

11 individuals who have some degree of reciprocal influence over one another (Rubin et al.,

12 2006). This level includes the concept of popularity or social acceptance by peers.

13 For many authors, a basic characteristic of friendship is that it is a reciprocal

14 relationship that must be recognized by both parties (Bukowski & Hoza, 1989; Hartup, 1983;

15 Rubin et al., 2006). Furthermore, reciprocity of affection is essential, rather than there being

16 instrumental motives. Friendships are thus voluntary and not prescribed (Bukowski & Hoza,

17 1989; Rubin et al., 2006). Several aspects of friendship have been examined in psychosocial

18 literature (Hartup, 1996): (a) having friends versus not having friends, (b) the identity of one's

19 friends, and (c) friendship quality. In their meta-analytic review, Newcomb and Bagwell

20 (1995) reported that friendships compared with non friendly relations are characterized by

21 more intense social activity, more frequent conflict resolution and more effective task

22 performance. Research examining who one's friends are, suggest that similar value

23 characteristics are a favorable factor to friendship forming and keeping (Fehr, 1996; Hartup,

24 1995). Finally, friendship quality refers to values such as satisfaction, construction, intimacy,

25 symmetry and emotional substrates in a dyadic relation (Hartup, 1996). Research has shown

1   that friendship quality in a school context is positively related to self-esteem and school

2   adjustment (Berndt, 1996). Friendship quality is also positively related to peer group

3   acceptance and negatively with the feeling of loneliness and social dissatisfaction (Parker &

4   Asher, 1993). Friendship quality thus appears as an important variable to understand

5   children's cognitions, emotions and behaviors.

6   In the past twenty years, several instruments have been devoted to assessing the

7   features of children's friendships through their own reports (e.g., Berndt & Perry, 1986;

8   Furman & Buhrmester, 1992; Parker & Asher, 1993). Although observational techniques have

9   also been used (e.g., Landsford & Parker, 1999), assessments of friendship quality are

10   essentially conducted with questionnaires or interview procedures (Rubin et al., 2006). These

11   measures generally capture perceived friendship quality and are based on the belief that a

12   child's perception of a relationship is the best index of this relationship (Furman, 1996).

13   Several tools can be identified in developmental psychology literature. For example, the

14   *"Network of Relationships Inventory"* (Furman & Buhrmester, 1985) comprised 10

15   dimensions, yielding three factor scores: social support, negative interaction, and power

16   imbalance. The social support factor taps into companionship, instrumental aid, intimacy,

17   nurturance, affection, admiration, and alliance. The negative interaction factor taps into

18   conflict and antagonism. In addition, Bukowski, Hoza and Boivin (1994) developed the

19   "Friendship Quality Scale". This instrument includes 23 items and was designed to identify

20   the following five components of friendship in children: (a) companionship, (b) help, (c)

21   security, (d) closeness, and (e) conflict. In parallel, Parker and Asher (1993) developed the

22   *"Friendship Quality Questionnaire"*, which was partially based on an early version of

23   Bukowski et al. (1994). This instrument includes 40 items and six subscales: (a)

24   companionship and recreation, (b) help and guidance, (c) caring, (d) intimate exchange, (e)

25   conflicts and betrayal, and (f) conflict resolution.

1   As the sport domain holds abundant opportunities for self-esteem enhancement and

2   conflict situations with friends and teammates, investigating the nature of friendship quality in

3   the social context of physical activity was also deemed important by sport psychology

4   researchers (Weiss & Smith, 1999; Weiss, Smith, & Theeboom, 1996). Because the

5   psychometric instruments and the conclusions of developmental psychology studies were

6   established in specific contexts such as the school context, they are not necessarily applicable

7   to another context (Zarbatany, Guesquière, & Mohr, 1992), such as the sport context.

8   To address the need for sport-specific instruments, Weiss and her colleagues (Weiss et

9   al., 1996; Weiss & Smith, 1999) conducted a series of studies to explore youth friendship in

10   the sport context. In a first study, Weiss et al. (1996) interviewed children aged 8 to 16 years

11   about the positive and negative aspects of, as well as their expectations regarding, their best

12   friendship in sport. Content analysis of these interviews identified 12 positive and 4 negative

13   dimensions of sport friendship in adolescents. The 12 positive dimensions of friendship

14   quality were the following: (a) companionship (e.g., "we do many things together"), (b)

15   pleasant play/association (e.g., "we enjoy doing things together"), (c) self-esteem

16   enhancement and supportiveness (e.g., "we positively reinforce each other"), (d) help and

17   guidance (e.g., "we help each other in sport"), (e) prosocial behavior (e.g., "we do nice things

18   for each other"), (f) intimacy (e.g., "we feel comfortable with each other"), (g) loyalty (e.g.,

19   "he/she sticks up for me"), (h) things in common (e.g., "we have similar interests in sport"),

20   (i) attractive personal qualities (e.g., I like her/his personality in general"), (j) emotional

21   support (e.g., "we care about each other"), (k) absence of conflict (e.g., "we rarely

22   argue/fight"), and (l) conflict resolution (e.g., "we resolve our conflicts"). The four negative

23   dimensions of sport friendship were: (a) conflict (e.g., "verbal insults"), (b) unattractive

24   personal qualities (e.g., "negative characteristics"), (c) betrayal (e.g., "says she will stop being

25   my friend"), and (d) inaccessibility (e.g., "we don't play much together"). Analysis of the

1   percentage of respondents (Weiss et al., 1996) citing these dimensions showed relatively few

2   differences across gender and age categories (i.e., 8-9 years, 10-12 years, 13-16 years).

3   Results revealed that (a) females referred more than males to emotional support; (b) the two

4   younger groups referred to prosocial behavior and loyalty more than the oldest group; (c) the

5   two older groups referred to attractive personal qualities more than the youngest group; and

6   (d) there was a progressive increase in the percentage of individuals citing intimacy as age

7   increased (Smith, 2007).

8   In a subsequent work, Weiss and Smith (1999) examined whether the general

9   friendship quality measure, Parker and Asher's (1993) *"Friendship Quality Questionnaire"*

10 (FQQ), was suitable for use in the physical domain. However, the results indicated that

11 applying the FQQ to the context of best sport friendships was problematic. Therefore, the

12 authors considered the good performing items of Parker and Asher (1993), and the children's

13 description of the features of their best sport friendships (Weiss et al., 1996) to develop the

14 *"Sport Friendship Quality Scale* (SFQS)". The factorial validity and reliability of this

15 instrument was tested within a sample of 196 children and adolescents (82 males and 114

16 females) aged from 8 to 16 (M_{age}= 11.3, SD_{age}= 2.5). Results from this series of studies

17 provided support for a six-factor model comprising 22 items [(a) Things in Common (TC, 4

18 items;); (b) Loyalty and Intimacy (LI, 4 items); (c) Companionship and Pleasant Play (CPP, 4

19 items); (d) Self-esteem Enhancement and Supportiveness (SE, 4 items); (e) Conflict

20 Resolution (CR, 3 items); and (f) Conflict (C, 3 items)]. Because several phi values (i.e.,

21 correlations among factors) were high in this model (i.e., seven > .70), two additional models

22 (i.e., single first-order model and six factors composing a higher-order factor) comprising the

23 same number of items were also investigated. Nevertheless, results from these analyses

24 provided lowest goodness of fit indices than the six-factor model.

1   Given that the SFQS is a relatively new measure, a recent interest has flourished, in

2   sport psychology literature, on the factorial structure of this instrument. Analysis of this

3   literature revealed that most of the studies were conducted with English-speaking samples

4   (Martin & Smith, 2002; McDonough & Crocker, 2005; Weiss & Smith, 2002) and only one

5   with non-English-speaking samples (Ommundsen, Roberts, Lemyre, & Miller, 2005). These

6   study results did not provide further support for the six-factor structure of Weiss and Smith's

7   (1999) SFQS. Indeed, Weiss and Smith (2002) conducted a similar Confirmatory Factorial

8   Analysis (CFA) of the SFQS within a sample of North American adolescents (M_{age} = 13.8,

9   SD_{age} = 2.3) comprising 191 tennis players (77 girls and 114 boys). Findings from this study

10   failed to replicate the six-factor structure of the SFQS. Analysis of modification indices

11   identified that both the loyalty and intimacy and companionship and pleasant play subscales

12   contributed to misfit in the SFQS measurement model. In order to improve the goodness of fit

13   of the original six-factor model, these authors decided to allow errors in the loyalty and

14   intimacy subscale of both items 2 and 20 and in the companionship and pleasant play subscale

15   of items 10 and . Subsequent analysis with this alternative model revealed a satisfactory fit of

16   the model to the data, as most fit indices met statistical criteria. However, because phi values

17   among the positive friendship subscales were moderate to large in magnitude (i.e., > .70), in

18   this model a latent two factors model was also tested (i.e., positive friendship dimensions and

19   conflict friendship dimension). Results revealed an unsatisfactory fit of the model to the data.

20   Parallel work conducted by Martin and Smith (2002) within a sample of 150 disabled

21   athletes also failed to support the six-factor model from Weiss and Smith's (1999) study.

22   Indeed, these authors rather provided a satisfactory factor structure for a two latent construct

23   model: (a) a global positive scale that combines the positive subscales of the SFQS, and (b)

24   the conflict friendship quality subscale. In a most recent investigation, Ommundsen et al.

25   (2005) tested the factorial structure of the SFQS using a Norwegian back-translation of this

1 instrument. The subscale "things in common" was not used as it was deemed irrelevant for the

2 research purpose of their study. Results performed within a Norwegian adolescent sample

3 including 1719 (488 girls: $M_{age} = 13.9$, $SD_{age} = 1.8$ years; 1231 boys: $M_{age} = 14.3$, $SD_{age} = 2.3$)

4 soccer players provided support for a three-factor model comprising 16 items: (a) loyalty and

5 free discussion (7 items), (b) companionship (6 items), and (c) conflict (3 items). For these

6 authors, the discrepant findings from this study and the previous studies with English-

7 speaking samples may stem from translation issues and cultural differences.

8   Lastly, McDonough and Crocker (2005) using a sample of 227 female adolescents

9 aged from 11 to 14 years failed to found support for the original six-factor model of the

10 SFQS. As already demonstrated by Weiss and Smith (2002), results revealed that the loyalty

11 and intimacy subscale was problematic and responsible for misfit in the SFQS measurement

12 model. However, the strategies used to treat this problem were different in both of these

13 studies. Indeed, while Weiss and Smith (2002) chose to modify their model by allowing error

14 terms to correlate, McDonough and Crocker (2005) rather decided to separate loyalty and

15 intimacy into two subscales. This strategy is theoretically consistent with developmental

16 psychology literature in friendship quality scales (e.g., Furman & Buhrmester, 1985; Parker &

17 Asher, 1993) and the qualitative work of Weiss et al. (1996) on sport friendship quality. A

18 seven-factor model including these modifications (i.e., loyalty and intimacy as two separate

19 constructs) was thus rerun and provided a better fit to the data than the six-factor model with

20 loyalty and intimacy combined. However, according to these authors (p. 462) "*these*

21 *results…must be interpreted with caution…Any modifications suggested by the data,*

22 *regardless of whether they are conceptually plausible, have a tendency to capitalize on*

23 *chance, providing a better model fit for this data set but inhibiting generalizability of the*

24 *results. As such, these modifications are presented as preliminary possibilities for further*

25 *study rather than as evidence confirming the validity of the modified model*". They thus

1   concluded that "*more work needs to be done to explore whether the seven-factor solution*

2   *provides similar results with other samples*" (p. 465).

3   In spite of these recommendations, to our knowledge, the factorial structure of the

4   SFQS was not further examined in any of the subsequent studies. When the research question

5   was not specific to particular components of friendship qualities, a global positive sport

6   friendship quality scale was used instead of specific subscales. This strategy was encouraged

7   by the high correlations between the positive friendship quality subscales. This global scale is

8   a composite latent of the five positive friendship quality subscales [i.e., (a) Things in

9   Common; (b) Loyalty and Intimacy; (c) Companionship and Pleasant Play; (d) Self-esteem

10   Enhancement and Supportiveness; (e) Conflict Resolution]. Furthermore, several studies have

11   provided support for the convergent validity of the SFQS with other measures such as

12   adaptive motivational orientations (Smith, Balaguer, & Duda, 2006; Smith, Ullrich-French,

13   Walker II, & Hurley, 2006), perceived physical competence and self-determined motivation

14   (Ullrich-French & Smith, 2006), and peer leadership (Moran & Weiss, 2006).

15   Only a handful of studies have specifically looked at age and gender differences in

16   sport friendship quality. Age-based differences using the original factor structure of the SFQS

17   showed that 10- to 13-year-olds perceived significantly higher companionship and pleasant

18   play, and significantly lower loyalty and intimacy, things in common, and conflict than 14- to

19   18-year-old (Weiss & Smith, 2002). According to these authors, these age differences

20   encountered during this developmental period exhibited that (a) young adolescents focus on

21   more concrete and overt elements of the social relationship (i.e., having things in common,

22   spending time together playing); and (b) older adolescents concentrate more on complex and

23   psychological qualities (i.e., loyalty, intimacy, and emotional support).

24   Gender-based differences using the six-factor model of sport friendship showed that

25   girls reported significantly higher self-esteem enhancement and supportiveness, loyalty and

1   intimacy, and things in common and significantly lower conflict than boys (e.g., Weiss &

2   Smith, 2002). Additional studies using a two-factor model of the SFQS (Martin & Smith,

3   2002; Smith et al., 2006a, 2006b; Ullrich-French & Smith, 2006) exhibited that girls also

4   reported significantly higher global positive friendship quality than boys. However, no

5   gender-based differences were found for the friendship conflict scale. The significant

6   differences observed by age or gender in sport context are consistent with the developmental

7   psychology findings (e.g., Newcomb & Bagwell, 1995; Parker & Asher, 1993).

8   Although the SFQS provides theoretical bases for studying sport friendship quality in

9   youth, all the studies (McDonough & Crocker, 2005; Ommundsen et al., 2005; Weiss &

10   Smith, 2002) that attempted to replicate Weiss and Smith's (1999) six-factor structure failed

11   to attain this objective. Analysis of the studies revealed that part of this failure to replicate the

12   original six-factor model in previous research might be due to, (a) the association of loyalty

13   and intimacy in a common subscale; and (b) the high associations among the positive

14   friendship quality subscales. To cope with these limitations, sport psychology researchers

15   (McDonough & Crocker, 2005; Ullrich-French & Smith, 2006) recommended rather using a

16   seven factor-model incorporating loyalty and intimacy in two separate subscales, or a global

17   positive scale of the SFQS when the research question is not specific to particular components

18   of friendship quality.

19   Given that the seven-factor solution was presented by McDonough and Crocker

20   (2005) as a preliminary possibility for further study rather than as evidence confirming the

21   validity of the modified model, more work needs to be done to explore the appropriateness of

22   this alternative SFQS model in other adolescent samples. Additionally, this research exhibited

23   several limitations. First, because this study was only performed with young adolescent girls

24   (i.e., 11-14 years old), the generalizability of the factorial structure across both gender and age

25   sub-samples (i.e., young adolescents: 11-13 years; older adolescents: 14-18 years) is not

1   established. Then, this study did not examine the factorial latent mean invariance of this

2   alternative SFQS model across gender and age categories. It is thus unknown whether gender

3   and age-based differences reported in the literature could be replicated with the seven-factor

4   model. Finally, this study has been confined to English-speaking samples. Whether the seven-

5   factor structure of the SFQS can be generalized to other cultures and non-English-speaking

6   countries is thus an open question. The replication of this alternative seven-factor structure of

7   the SFQS in another country, such as France, would ensure that the sport friendship quality

8   construct is not biased by colloquialisms and idiosyncrasies of the language in which it was

9   originally developed. An accurate French version of the SFQS would also help sport

10   psychology researchers to expand studies in French-speaking samples.

11   Given the previous results and limitations, the present series of studies attempted to:

12   (a) develop a preliminary French version of the SFQS (SFQS-FR) and test its suitability in

13   samples of children and adolescents; (b) address the aforementioned limitations by examining

14   the SFQS-FR's factorial validity (i.e., factorial structure and invariance), reliability (i.e.,

15   internal consistency and temporal stability) and the latent mean invariance across gender and

16   age in an adolescent sample. Based on the aforementioned research, it was thus hypothesized

17   that (a) McDonough and Crocker's (2005) seven-factor model would provide acceptable

18   goodness of fit indices regarding total and gender and age sub-samples; (b) the seven-factor

19   structure of the SFQS would hold across gender and age categories; (c) young adolescents

20   (i.e., 11- to 13 year-olds) would rate significantly higher companionship and pleasant play,

21   and significantly lower loyalty, intimacy, things in common, and conflict than older

22   adolescents (i.e., 14- to 18 year-olds), and (d) girls would rate significantly higher self-esteem

23   enhancement and supportiveness, loyalty, intimacy, and things in common, and significantly

24   lower conflict than boys.

25   Study 1

1   Given the absence of a validated French version of the SFQS, the purpose of the first

2   study was two-fold: (a) to develop a preliminary version of the SFQS-FR, and (b) to verify its

3   content clarity in a sample of French children and adolescents.

4   *Method*

5   A committee approach (Vallerand, 1989) was used for translation. Thus, the

6   preliminary SFQS-FR version was developed by four bilingual individuals including three

7   sport psychology researchers and a specialist in the field of friendship research. Two criteria

8   guided the translation process: (a) conformity with the original questionnaire intentions and

9   (b) clarity of the items in the French language. A decision was also made to use language that

10   would make the items understandable to children and adolescents and to use International

11   French to avoid colloquialism (e.g., Fournier, Gaudreau, Demontrond-Behr, Visioli, Forest, &

12   Jackson, 2007). Equivalent to the SFQS scale, the reference point for responses was one

13   person rather than friends on the team in general, as reflected by the following stem: "Think

14   of your best friend in sports". Then, as suggested by Brislin (1986), two English teachers

15   reverse-translated this experimental questionnaire. The reversed translation proved to be

16   satisfactory, since the new version was identical to the original version of the SFQS. The

17   French experimental version, which was to be tested, was called the SFQS-FR.

18   To evaluate the clarity of the SFQS-FR items, 20 children and early adolescents aged

19   from 8 to 12 [10 girls (M_{age} = 10.62; SD_{age} = 1.67) and 10 boys (M_{age} = 11.04; SD_{age} = 1.02)]

20   were recruited. This age bracket was chosen in order to ensure the design of a questionnaire

21   accessible to children as well as to adolescents (Weiss & Smith, 1999). These young athletes

22   participated in a variety of activities such as sailing, soccer and gymnastics. The questionnaire

23   included 22 items accompanied by a five-point Likert scale (from 1 = not at all clear to 5 =

24   completely clear) to assess item clarity. The participants were invited to respond as honestly

25   as possible to the questions; anonymity was guaranteed. The youths and their parents had

1   been informed of the study protocol one week earlier and parental consent was obtained.

2   Questionnaire completion was carried out under standardized conditions (i.e., isolation, paper,

3   pencil, help for reading if necessary, and prohibition to communicate). The procedure did not

4   exceed 15 minutes. Following completion of the questionnaires, individual interviews were

5   held to identify problems related to the items (e.g., comprehension, relevance).

6   *Results and Discussion*

7   The items with a score lower than four were considered unsatisfactory following

8   Vallerand's (1989) recommendations. The results indicated that the following items were

9   problematic: TC3 = 3.10, RC11 = 2.90, C12 = 3.10, TC15 = 2.50 and C18 = 2.60. A number

10   of criteria were adopted to retain or disregard items. Some of the English words in the

11   translated version of the SFQS scale were too hard to understand or contained a double

12   meaning for French youths (i.e., TC3: "My friend and I have common interests"; C18: "My

13   friend and I stick up for each other in sports"; RC11: "My friend and I try to work things out

14   when we disagree"; TC15: "My friend and I have the same values"). To ensure the same

15   meaning in French and English, we adapted the vocabulary for the troublesome items.

16   Moreover, the items on the conflict scale were also adapted because the language level was

17   misunderstood by adolescents (C12: "Mon ami(e) et moi nous nous battons" was changed to

18   "Mon ami(e) et moi on se bagarre", which better corresponds to the way French adolescents

19   actually speak).

20   Following these modifications, a new evaluation of item clarity was carried out with a

21   sample of 25 children and adolescents from 10 to 16 years old [10 boys playing ice hockey

22   (M_{age} = 13.50; SD_{age} = 1.65) and 15 girls practicing figure skating (M_{age} = 13.50; SD_{age} =

23   1.71). The procedure was the same as described above. The degree of item clarity was again

24   scored on the same five-point Likert scale. The global average of item clarity (M_{age} = 4.45;

25   SD_{age} = 1.26) revealed that all the SFQS-FR items were easily understandable and the scores

1   of the items which had been misunderstood were satisfactory (TC3 = 4.35, RC11 = 4.60, C12

2   = 4.20, TC15 = 4.50, and C18 = 4.70).

3   The clarity assessment thus required two stages because of the difficulty in translating

4   some of the items and adapting the vocabulary to French youths. Seventeen items from the

5   original translated version remained unchanged, three items were slightly modified, and two

6   items were substantially reworded, as often reported in cross-cultural translation studies (e.g.,

7   Fournier et al., 2007; Heuzé & Fontayne, 2002). As a result, this study allowed us to assume

8   that the preliminary version of the SFQS-FR was appropriate for French-speaking children

9   and adolescents. This version is provided in Table 1.

10   Study 2

11   The purpose of Study 2 was to assess the concurrent validity of the SFQS-FR

12   (Vallerand, 1989). To this end, responses from the original English version (i.e., the SFQS)

13   were compared with those from the translated French version (i.e., the SFQS-FR) using

14   bilingual respondents.

15   *Method*

16   As recommended by Gonzales-Reigosa (1976) and Vallerand and Halliwell (1983),

17   the degree of participant bilingualism was evaluated through four items (i.e., being able to

18   read English/French; being able to write English/French; being able to understand an

19   English/French conversation; being able to express oneself in English/in French)

20   accompanied by a four-point Likert scale (i.e., from 1 = not at all true to 4 = completely true).

21   For this study, 14 voluntary adults practicing a variety of sports were recruited (M_{age} = 20.10;

22   SD_{age}= 3.20). Adults were recruited for this specific study because, in France, it is a lot easier

23   to find a high degree of bilingualism in adults than in adolescents. The degree of bilingualism

24   (M_{French} =15.00, SD_{French} = 20.00; $M_{English}$ =16.00, $SD_{English}$ = 20.00) was satisfactory

1 (Vallerand, 1989) and no mean differences were found between the French and English

2 languages [t(13) = -.86, p = .40]. All participants were thus characterized by a degree of

3 bilingualism that was homogeneous and sufficient to complete the questionnaires in both

4 languages. For seven participants, the questionnaire was first completed in its original version

5 and then, half an hour later, in its experimental version. The seven other participants followed

6 the opposite order. The items were presented in a different order in both versions.

7 *Results and Discussion*

8 A correlational analysis was used to evaluate the relations between the responses

9 obtained on the SFQS and SFQS-FR versions and thereby determine the concurrent validity.

10 The results indicated that the subscales were perceived in a similar way in the original (i.e.,

11 SFQS) and translated versions (i.e., SFQS-FR). The correlation coefficients between the

12 SFQS and the SFQS-FR subscales ranged from .89 to .97 and were significant for all items

13 $(p < .05)$[1]. A series of Student *t* tests for matched samples was also computed (Triandis &

14 David, 1965). This allowed us to observe differences in the scores of each item response in

15 the original and the translated scale. These results were non-significant and indicated that the

16 responses to the SFQS and SFQS-FR items were equivalent[2]. They thus confirmed the

17 concurrent validity between the original and the preliminary translated version.

18 Study 3

19 The purpose of the third study performed with the SFQS-FR was to test its factorial (a)

20 structure using a series of CFA, (b) reliability (i.e., internal consistency and temporal

21 stability), and (c) latent mean invariance across gender and age categories.

22 *Method*

23 The sample included 422 adolescents from four middle schools in the Southeast of

24 France [207 girls (M_{age} = 13.69; SD_{age} = 1.58) and 215 boys (M_{age} = 13.69; SD_{age} = 1.58)].

25 All adolescents regularly attended physical education classes and some also practiced a club

1   sport. The SFQS-FR was administered to the participants at the beginning of a physical

2   education class. The adolescents had been informed on an earlier occasion that: (a) study

3   participation was not obligatory and their identities would remain anonymous; (b) the

4   questionnaire was not a test (i.e., "there are no good or bad answers; you answer what you

5   think"); and (c) the data obtained would be used only for research purposes and would remain

6   strictly confidential. The participants were invited to think about their sport context and a

7   person they considered to be their best friend in sports (on a team in their club sport or in

8   physical education classes) while responding to the questionnaire. All parents and school

9   directors gave informed consent before the study began. The questionnaires were completed

10   within 20 minutes under the same standardized conditions as in Study 1.

11   *Analyses*

12   Because of the significant multivariate non-normality of the data (normalized

13   skewness: 63.56; normalized kurtosis: 11.50), the series of CFA was performed using

14   bootstrapped maximum likelihood estimation with the AMOS 7.0 program (Arbuckle, 2006).

15   Based on the aforementioned literature, three distinct models were tested on pooled sample

16   data: (a) a six-correlated factor model (i.e., model 1, Weiss & Smith, 1999); (b) a two-factor

17   model (i.e., model 2; Weiss & Smith, 2002); and (c) a seven-correlated factor model (i.e.,

18   model 3; McDonough & Crocker, 2005). The Weiss and Smith (2002) six-factor correlated

19   errors model and the Ommundsen et al. (2005) three-factor model were excluded from the

20   CFA analyses because of their limits (i.e., correlated uniquenesses and incomplete factor

21   testing).

22   The first model (i.e., Model 1, Weiss & Smith, 1999) hypothesized that: (a) answers to

23   the SFQS-FR would be explained by six first-order factors labeled: things in common (4

24   items), loyalty and intimacy (4 items), companionship and pleasant play (4 items), self-esteem

25   enhancement and supportiveness (4 items), conflict resolution (3 items), and conflict (3

1 items); (b) each item would have a non-zero loading on the SFQS-FR factor that it was

2 designed to measure and zero loadings on all other factors; (c) the six factors would be

3 correlated; (d) the following items would be fixed to 1.0: SE1, LI2, TC3, CPP4, CR5, C6; and

4 (e) error terms would be uncorrelated.

5   The second model (i.e., Model 2, Weiss & Smith, 2002) hypothesized that: (a) answers

6 to the SFQS-FR would be explained by two first-order factors labeled: positive dimension of

7 friendship quality (19 items) and negative dimension of friendship quality (3 items); (b) each

8 item would have a non-zero loading on the SFQS-FR factor that it was designed to measure

9 and zero loadings on the other factor; (c) the two factors would be correlated; (d) error terms

10 would be uncorrelated; and (e) the following items would be fixed to 1.0: SE1; C6 and (e)

11 error terms would be uncorrelated.

12   The third model (i.e., Model 3, McDonough & Crocker, 2005) hypothesized that: (a)

13 answers to the SFQS-FR would be explained by seven first-order factors labeled: things in

14 common (4 items), loyalty (2 items), intimacy (2 items), companionship and pleasant play (4

15 items), self-esteem enhancement and supportiveness (4 items), conflict resolution (3 items)

16 and conflict (3 items); (b) each item would have a non-zero loading on the SFQS-FR factor

17 that it was designed to measure and zero loadings on all other factors; (c) the seven factors

18 would be correlated; (d) the following items would be fixed to 1.0: SE1, I2, L8, TC3, CPP4,

19 CR5, C6; and (e) error terms would be uncorrelated. At the end of this series of tests, the best

20 CFA model would be retained.

21   Factorial and latent mean invariance tests through gender and age categories (i.e., 11-13

22 years and 14-18 years) were performed on the best CFA model and in the sequential order

23 recommended by Gregorich (2006): (a) dimensional/configural (i.e., no invariance), (b)

24 metric (i.e., equal loadings), (c) strong (i.e., equal intercepts), (d) strict (i.e., equal

25 uniquenesses), and (e) equal means.

1   Assessment of model fit was based on multiple indicators (e.g., Hu & Bentler, 1999;

2   Vandenberg & Lance, 2000): the chi square (χ^2), the Comparative Fit Index (CFI), the

3   Tucker-Lewis Index (TLI), the Root Mean Square Error of Approximation (RMSEA) and the

4   90% Confidence Interval of the RMSEA (RMSEA 90% CI). Values greater than .90 for CFI

5   and TLI are considered to be indicative of acceptable model fit (Hu & Bentler, 1999;

6   Vandenberg & Lance, 2000), although values approaching .95 are preferable. In addition,

7   values equal to or lower than .08 and .05 for RMSEA indicate, respectively, acceptable and

8   good model fit (Hu & Bentler, 1999; Vandenberg & Lance, 2000). Concerning the RMSEA

9   90% CI, values less than .05 for the lower bound (left side) and less than .08 for the upper

10   bound (right side) or containing 0 for the lower bound and less .05 for the upper bound (right

11   side) provide, respectively, acceptable and good model fit (MacCallum, Browne, &

12   Sugawara, 1996). Because χ^2 difference tests cannot be legitimately performed on non-nested

13   models, the Expected Cross Validation Index (ECVI) and Akaike Information Criterion (AIC)

14   were used. The AIC value was computed based on the chi-square value for the model minus

15   two times the number of estimated parameters (Akaike, 1987). The ECVI is a single sample

16   estimate that indicates how well the current solution would fit in an independently drawn

17   sample (Browne & Cudeck, 1993). The AIC and ECVI are not normed on a zero to one scale.

18   Reductions of their values, in comparison with other competing models, demonstrated an

19   improved and more parsimonious fit of a model (Motl & Conroy, 2000).

20   Intercorrelations, factor loadings, standardized residuals, square multiple correlations,

21   standard error, *t* values and modification indices were also inspected for appropriate signs

22   and/or magnitude. Critical values for the gender invariance tests performed on the best CFA

23   model were evaluated by examination of several criteria: χ^2 difference tests and CFI and

24   RMSEA changes (Chen, 2007; Cheung & Rensvold, 2002; Vandenberg & Lance, 2000). A

25   CFI difference of .01 or less and RMSEA differences of .015 or less between a reference and

1   a resulting model indicated that the invariance hypothesis should not be rejected. Analysis of

2   the discriminant validity of the SFQS-FR was realized using latent factor correlations as

3   suggested by Bagozzi and Kimmel (1995). According to these authors, the validity of two

4   distinct constructs is supported when the result of the multiplication of the standard error of

5   the factor correlation by 1.96 is less than unity. Finally, reliability was computed with both

6   Cronbach's alpha and the model's standardized parameter estimates, using the formula

7   provided by Bagozzi and Kimmel (1995): $\rho = (\Sigma\lambda i)^2 / ([\Sigma\lambda i]^2 + \Sigma\delta ii)$ where λi are the factor

8   loading and δii the error variances.

9   *Results and Discussion*

10   *Factorial validity.* The results from the series of CFA are presented in Table 2. All

11   models exhibited significant bootstrapped χ^2 values. As displayed in Table 2, goodness of fit

12   indices were acceptable (i.e., > .90 for CFI and TLI; ≤ .06 for RMSEA) for models 1 and 3.

13   Loadings and uniqueness of models 1 and 3 are presented in Table 3 and were significant and

14   substantial in both models. Comparison of acceptable models (i.e., models 1, 2 and 3)

15   revealed that the third one (McDonough & Crocker, 2005) provided the best goodness of fit

16   indices, as well as the lowest ECVI and AIC indices. This model, which is the best, was thus

17   retained for subsequent analysis: gender and age invariance tests and test-retest reliability.

18   *Internal consistency and latent intercorrelations.* The results regarding the internal

19   consistency, latent intercorrelations and standard error of model 3 are provided in Tables 4

20   and 5. First, all scales presented modest to acceptable Cronbach's alpha (i.e., ranging from .68

21   to .80) and composite reliability coefficients (i.e., ranging from ρ=.70 to .88) (see Table 4).

22   Second, latent variable intercorrelations were moderate to large in magnitude (Φ = -.43 to .86;

23   8 values >.70) and statistically significant (see Table 5). They were similar to those found by

24   Weiss and Smith (2002) and McDonough and Crocker (2005). Thus, these results provided

25   evidence for the discriminant validity of the SFQS-FR in a French population, according to

1   Bagozzi and Kimmel (1995) criteria. These criteria state that the validity of two distinct

2   constructs is confirmed when the result of the multiplication of the standard error of the factor

3   correlation by 1.96 is less than unity (Bagozzi & Kimmel, 1995; Hagger, Biddle, & Wang,

4   2005).

5   *Factorial and latent mean invariance tests across gender.* The results from the gender

6   sub-samples and gender invariance tests are provided in Table 6. CFA performed with sub-

7   samples of boys and girls using the best SFQS-FR model (i.e., model 3) showed significant

8   bootstrapped χ^2 values (see Table 6). Nevertheless, as displayed in Table 6 the CFI, TLI and

9   RMSEA fit indices were acceptable (i.e., > .90 for CFI and TLI; < .06 for RMSEA).

10   The first model of invariance (i.e., dimensional) provided significant bootstrap χ^2 and

11   acceptable indices for CFI (i.e., > .90) and RMSEA (i.e., < .05), with the exception of TLI

12   (i.e., < .90). The next model (i.e., equal factor loadings) provided (a) significant bootstrap χ^2;

13   (b) acceptable fit indices for CFI (i.e., > .90) and RMSEA (i.e., < .05), with the exception of

14   TLI (i.e., < .90); and (c) evidence of metric invariance [i.e., ΔML $\chi^2(10.10)$, df = 15, p =

15   .812; ΔCFI< .01; ΔRMSEA < .015]. The third model (i.e., intercepts equal) revealed

16   significant bootstrap χ^2 and acceptable CFI (i.e., > .90) and RMSEA (i.e., < .05) indices, with

17   the exception of TLI (i.e., < .90). Nevertheless, this model of strong invariance was rejected

18   based on changes in ML chi square [i.e., ΔML $\chi^2(38.80)$, df = 15, p = .001]. Modification

19   indices provided by AMOS 7.0 suggested that the gender-group equality constraint in the

20   intercept for item 12 contributed most strongly to the lack of fit. The fourth model freely

21   estimated this parameter in both gender groups and provided evidence of partial strong

22   invariance [i.e., ΔML $\chi^2(20.80)$, df = 14, p = .11; ΔCFI< .01; ΔRMSEA< .015]. The next

23   model tested the partial strict factorial invariance by imposing equality gender-group

24   constraints on all corresponding uniquenesses, except for those for item 12. Based on changes

1   in ML chi square [i.e., ΔML χ^2(96.90), df = 21, $p < .001$], this model was also rejected.

2   Analysis of modification indices provided by AMOS 7.0 revealed that freely estimate

3   uniqueness for items 6, 8, 13, 14, 15, 18, 20, and 21 would significantly improve goodness of

4   fit indices. The model was thus re-specified according to these suggestions and the CFA was

5   rerun. The sixth model provided thus: (a) significant bootstrap χ^2, (b) acceptable fit indices

6   for CFI (i.e., $> .90$) and RMSEA (i.e., $< .05$), with the exception of TLI (i.e., $< .90$); and (c)

7   evidence of partial strict invariance [i.e., ΔML χ^2(20.80), df = 13, $p = .08$; ΔCFI $< .01$;

8   ΔRMSEA $< .015$]. Finally, the seventh model exhibited: (a) significant bootstrap χ^2, (b)

9   acceptable fit indices for CFI (i.e., $>.90$) and RMSEA (i.e., $< .05$), with the exception of TLI

10   (i.e., $<.90$); and (c) evidence of lack of latent mean invariance across genders [i.e., ΔML

11   χ^2(26.20), df = 7, $p = .001$]. Examination of latent mean revealed that boys do indeed present

12   significantly lower scores of companionship and pleasant play (Latent mean = -.12, $t = -2.27$,

13   $p = .02$, $d = .22$), conflict (Latent mean = -.26, $t = -2.58$, $p = .01$, $d = .25$) and intimacy (Latent

14   mean = -.24, $t = -3.51$, $p<.001$, $d = .34$) than girls. However, no differences were found in

15   self-esteem enhancement and supportiveness (Latent mean = -.03, $t = -.43$, $p = .61$, $d = .04$),

16   loyalty (Latent mean = -.11, $t = -1.55$, $p = .12$, $d = .15$), things in common (Latent mean = -

17   .02, $t = -.30$, $p = .76$, $d = .03$), and conflict resolution (Latent mean = -.14, $t = -1.63$, $p = .10$,

18   $d = .16$).

19   *Factorial and latent mean invariance tests across age categories*. The results from the

20   age sub-samples and age invariance tests are provided in Table 7. CFA performed with sub-

21   samples of youngster from 11 to 13 years old ($N = 132$) and from 14 to 18 years old ($N = 290$)

22   using the best SFQS-FR model (i.e., model 3) showed significant bootstrapped χ^2 values (see

23   Table 7). Nevertheless, as displayed in Table 7, the CFI, TLI and RMSEA fit indices were

1   acceptable in most cases (i.e., > .90 for CFI and TLI; < .06 for RMSEA) with an exception for

2   the TLI values for the 11-13 year old participants that were < .90.

3   The first model of invariance (i.e., dimensional) provided significant bootstrap χ^2 and

4   acceptable indices for CFI and TLI (i.e., > .90) and RMSEA (i.e., < .05). The next model (i.e.,

5   factor loadings equal) provided (a) significant bootstrap χ^2; (b) acceptable fit indices for CFI

6   and TLI (i.e., > .90) and RMSEA (i.e., < .05); and (c) evidence for metric invariance [i.e.,

7   ΔML χ^2(13), df = 15, p = .60; ΔCFI < .01; ΔRMSEA < .015]. The third model (i.e., intercepts

8   equal) revealed (a) significant bootstrap χ^2; (b) acceptable CFI and TLI (i.e., > .90) and

9   RMSEA (i.e., < .05) indices; and (c) evidence of strong invariance [i.e., ΔML χ^2(15.4), df =

10   15, p = .42; ΔCFI $\leq$ .01; ΔRMSEA < .015]. The next model tested the strict factorial

11   invariance by imposing equality age-group constraints on all corresponding uniquenesses.

12   Based on changes in ML chi square [i.e., ΔML χ^2(40.4), df = 22, p < .01], this model was

13   rejected. Analysis of modification indices provided by AMOS 7.0 revealed that freely

14   estimate uniqueness for item 10 would significantly improve goodness of fit indices. The

15   model was thus re-specified according to these suggestions and the CFA was rerun. The fifth

16   model provided: (a) significant bootstrap χ^2, (b) acceptable fit indices for CFI and TLI (i.e., >

17   .90) and RMSEA (i.e., < .05); and (c) evidence of partial strict invariance [i.e., ΔML χ^2(31.8),

18   df = 21, p = .06; ΔCFI $\leq$ .01; ΔRMSEA < .015]. Finally, the sixth model exhibited: (a)

19   significant bootstrap χ^2, (b) acceptable fit indices for CFI and TLI (i.e., >.90) and RMSEA

20   (i.e., < .05); and (c) evidence of a lack of latent mean invariance across age categories [i.e.,

21   ΔML χ^2(14.4), df = 7, p = .04]. Examination of latent mean revealed that 11 to 13 year old

22   participants do indeed present significantly higher scores of things in common (Latent mean =

23   .16, t = 2.06, p = .04, d = .22) and intimacy (Latent mean = .19, t = 2.82, p=.005, d = .30) than

24   the 14 to 18 year old participants. However, no differences were found in companionship and

1   pleasant play (Latent mean = .10, t = 1.87, p = .06, d = .20), conflict (Latent mean = .17, t =

2   1.55, p = .12, d = .16), self-esteem enhancement and supportiveness (Latent mean = .12, t

3   =1.84, p = .07, d = .19), loyalty (Latent mean = .14, t = 1.85, p = .06, d = .19) and conflict

4   resolution (Latent mean =.10, t = 1.08, p = .28, d = .11)

5   Study 4

6   The purpose of the last study was to test the temporal stability of the best SFQS-FR

7   model retained in Study 3 in a new adolescent sample over a five-week period.

8   *Method*

9   This new sample included 105 adolescents [53 boys (M = 13.22, SD = 1.46) and 52

10   girls (M_{age} = 12.97, SD_{age} = 1.32)] who attended both physical education classes and club

11   sport sessions every week. The SFQS-FR was administered to the participants twice over a

12   five-week period. The questionnaires were completed under the same standardized conditions

13   as in Study 1. For the second time, the participants were asked to keep in mind the same best

14   friend as the first time. Both times, they were asked to indicate the initials of the best friend,

15   which allowed us to verify the consistency of their choice. The nine participants who did not

16   consider the same friend were not included in the analyses.

17   *Analyses*

18   The temporal stability of model 3 was assessed using the Intraclass Correlations

19   Coefficients (ICC), 95% Confidence Interval of the ICC (ICC 95% CI) and a series of Student

20   *t* tests for matched samples.

21   *Results and Discussion*

22   The results from the ICC, ICC 95% CI and the Student *t* tests are provided in Table 4.

23   The ICC were statistically significant in all cases. The ICC for each subscale were ranging

24   from .66 to .80, demonstrating for each subscales an acceptable inter-rater reliability. These

25   reliability analyses confirmed thus the temporal stability of the instrument. Moreover, as

1   reported in Table 4, none of the Student *t* tests for matched samples were significant ($p > .05$).

2   In sum, these results revealed that the adolescents' SFQS-FR responses were highly

3   consistent through time.

4   General Discussion

5   The main purpose of the present series of studies was to test the factor validity and

6   reliability of Weiss & Smith's (1999) SFQS in a French adolescent sample. To this end,

7   several factorial structure models based on those found in the literature were tested

8   (McDonough & Crocker, 2005; Weiss & Smith, 2002). It was hypothesized that McDonough

9   and Crocker's (2005) seven-factor model would provide acceptable goodness of fit indexes

10   across total and gender and age sub-samples. Results from CFA revealed that two models

11   provided acceptable fit indexes: Weiss and Smith's (1999) six-factor structure and

12   McDonough and Crocker's (2005) seven-factor structure (i.e., separating the loyalty and

13   intimacy factor into two subscales). Both of these models confirmed the multi-dimensional

14   structure of the concept of friendship quality identified in developmental psychology

15   literature (Bukowski et al., 1994; Parker & Asher, 1993). They are consistent with the

16   dimensions typically found in questionnaires assessing friendship quality through (a) the

17   functions of friendship (e.g., provision of companionship, level of intimate disclosure, degree

18   of helpfulness and advice), (b) conflict and disagreements, and (c) the affective properties of

19   friendship (Rubin et al., 2006).

20   Analysis of goodness of fit indices (i.e., CFI, TLI, RMSEA) and specifically those

21   used to compare non-nested models (i.e., ECVI and AIC) revealed that McDonough and

22   Crocker's (2005) seven-factor model would be the most appropriate for French youths.

23   Subsequent analyses performed with this model provided evidence of adequate to good

24   factorial reliability (i.e., internal consistency and temporal stability). The suitability of

25   McDonough and Crocker's (2005) seven-factor structure for the present data thus reactivates

1   the theoretical rationale for splitting loyalty and intimacy into two separate dimensions

2   (Furman & Buhrmeister, 1985; Parker & Asher, 1993).

3   Furthermore, it was hypothesized that the seven-factor structure of the SFQS would

4   hold across gender and age categories. The findings from this study provide support for the

5   partial factorial structure invariance of a 21-item version of the SFQS-FR across gender.

6   Indeed, analysis revealed that item 12 ("my friend and I fight") lacked invariance between

7   boys and girls. This lack invariance may stand out because of boys' and girls' conceptions of

8   the term "fight"[3]. For boys this might invoke ideas about physical conflict, whereas girls

9   might think of relational conflict (Weiss & Stuntz, 2004). As observed in previous studies in

10   both developmental and sport psychology (Parker & Asher, 1993; Weiss & Smith, 2002;

11   Zarbatany, McDougall, & Hymel, 2000), the subsequent latent mean analysis revealed that

12   girls scored higher than boys on the intimacy subscale, and that no gender differences were

13   observed in the things in common and conflict resolution subscales (Weiss & Smith, 2002).

14   Moreover, in contrast to the aforementioned literature (i.e., Weiss & Smith, 2002), girls also

15   presented higher scores than boys in both the conflict and companionship and pleasant play

16   subscales. Higher conflict ratings for girls in our study might mirror the tendency of

17   adolescent girls towards relational conflict, as a hidden culture of aggression (Simmons, 2002;

18   Weiss & Stuntz, 2004). The discrepant findings between the Weiss and Smith (2002) study

19   and the present research, regarding the self-esteem enhancement and supportiveness, and the

20   loyalty subscales, may emanate from the sample homogeneity with regard to activity level

21   and value toward sport (Weiss & Smith, 2002).

22   CFA revealed that the model was partially invariant across age: all items, except item

23   10 (i.e., "I like to play with my friend"), were invariant across young and older adolescents. It

24   can be hypothesized that item 10 was not invariant because it would resonate with older youth

25   less than younger youth, because of the phrase "play with"[4]. Younger children would use this

1   phrase freely, whereas older youth would either find the phrase babyish or, alternatively,

2   humorous because it carries a double meaning that is sexual in nature. In addition, it was

3   hypothesized that young adolescents (i.e., 11- to 13-year-olds) would rate significantly higher

4   companionship and pleasant play, and significantly lower loyalty, intimacy, things in

5   common, and conflict than older adolescents (i.e., 14- to 18-year-olds), and girls would rate

6   significantly higher self-esteem enhancement and supportiveness, loyalty, intimacy, and

7   things in common, and significantly lower conflict than boys. In contrary to the

8   developmental psychology literature (Newcomb & Bagwell, 1995) but consistent with Weiss

9   and Smith's (2002) results, we did not find any age-group differences for self-esteem

10   enhancement and supportiveness, and conflict resolution. These findings would confirm the

11   hypothesis of a specific influence of the nature and climate of youth sport programs (Weiss &

12   Smith, 2002; Zarbatany et al., 1992). Moreover, in contrast to Weiss and Smith's (2002)

13   results, the younger participants also scored higher on things in common and intimacy

14   subscales. The unexpected finding on the things in common suscale might be explained by the

15   fact that adolescents tend to affirm their difference and their identity, and would be more

16   sensible to complementary features in their friendships than to similarity (Sullivan, 1953).

17   Additionally, it can be hypothesized than the word "secret" included in item 20 of the

18   intimacy subscale was seen as too babyish by adolescents and thus not meaningful for them[5].

19   Finally, we observed discrepant results with the Weiss and Smith (2002) study on the loyalty

20   and conflict subscales. As noted earlier, these differences may emanate from the sample

21   homogeneity with regard to activity level and value toward sport (Weiss & Smith, 2002).

22   A typical limitation of research approaches based on self-report measures concerns the

23   potential for social desirability bias. As aforementioned, however, several authors have

24   concluded that questionnaire or interview procedures are the most appropriate means (or even

25   the sole way) to capture perceived friendship quality (Furman, 1996; Rubin et al., 2006). Yet,

1   future studies could use observational approaches that rely on measurements of the

2   interpersonal behaviors between friends related to perceived friendship quality. Such studies

3   with French youth samples would provide additional support for the SFQS-FR construct

4   validity. There is also a need for further testing of the factorial and latent mean structure

5   invariance of this instrument with an independent sample, as well as with high skill-level

6   participants. Other critical steps would be, (a) to assess the construct validity of the SFQS-FR

7   by examining, in a French adolescent sample, the relationships of sport friendship quality

8   with other theoretically relevant variables or constructs, such as motivation (e.g., Smith et al.,

9   2006), and (b) to examine the cross-cultural validity of the instrument responses.

10   In conclusion, this series of studies with French youth involved in sports provided

11   support for the factorial validity and reliability of the McDonough and Crocker (2005) seven-

12   factor model of the SFQS-FR. This instrument appears to be an appropriate instrument for use

13   with French children and adolescents practicing club sports or attending physical education

14   classes. The French version of the SFQS comprises 22 items that measure seven dimensions:

15   (a) things in common (4 items), (b) loyalty (2 items), (c) intimacy (2 items), (d)

16   companionship and pleasant play (4 items), (e) self-esteem enhancement and supportiveness

17   (4 items), (f) conflict resolution (3 items), and (g) conflict (3 items). This instrument will both

18   (a) help sport psychology researchers to better understand peer relationships among French

19   adolescents, and (b) encourage cross-cultural studies highlighting the importance of peers as

20   social agents in youth sport.

21

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1   Footnotes

2   [1,2] Details about the results are available upon request from the first author.

3   [3,4,5] The authors thank one of the reviewer for these interesting suggestions.

4

1   Table 1

2   *Items of the SFQS-FR (Original English items are in parentheses).*

Scales	Items
Estime de soi (*Self-esteem Enhancement and supportiveness*)	1. Mon ami(e) me donne une seconde chance de faire une performance. *(My friend gives me a second chance to perform a skill).* 7. Mon ami(e) et moi nous nous félicitons quand nous faisons de bonnes performances en sport. *(My friend and I praise each other for doing sports well).* 14. Lorsque je fais des erreurs mon ami(e) m'encourage. *(After I make mistakes, my friend encourages me).* 22. Mon ami(e) a confiance en moi en sport. *(My friend has confidence in me during sport).*
Loyauté (*Loyalty*)	8. Mon ami(e) et moi nous nous soutenons en sport. *(My friend and I stick up for each other). (Loyalty)* 13. Mon ami(e) prend soin de moi. *(My friend looks out for me).(Loyalty)*
Intimité (*Intimacy*)	2. Mon ami(e) et moi pouvons parler de tout. *(My friend and I can talk about anything).* 20. Mon ami(e) et moi nous nous racontons des secrets. *(My friend and I tell each other secrets).*
Choses en commun (*Things in Common*)	3. Mon ami(e) et moi nous nous intéressons à la même chose. *(My friend and I have common interests).* 9. Mon ami(e) et moi faisons les mêmes choses. *(My friend and I do similar things).* 15. Mon ami(e) et moi avons les mêmes idées de ce qui est bien ou mal en sport (comme par exemple tricher). *(My friend and I have the same values).* 19. Mon ami(e) et moi pensons de la même manière. *(My friend and I think the same way).*
Compagnonage et Jeux plaisants (*Companionship and Pleasant Play*)	4. Mon ami(e) et moi faisons des choses amusantes. *(My friend and I do fun things).* 10. J'aime m'amuser avec mon ami(e). *(I like to play with my friend).* 17. Mon ami(e) et moi jouons bien ensemble. *(My friend and I play well together).* 21. Mon ami(e) et moi passons du temps ensemble. *(My friend and I spend time together).*
Résolution de conflit (*Conflict Resolution*)	5. Mon ami(e) et moi nous nous réconcilions facilement quand nous nous disputons *(My friend and I make up easily when we have a fight).* 11. Mon ami(e) et moi essayons d'éclaircir la situation quand nous ne sommes pas d'accord. *(My friend and I try to work things out when we disagree).* 16. Quand nous nous disputons mon ami(e) et moi en parlons afin de trouver une solution. (*When we have an argument, my friend and I talk about how to reach a solution).*
Conflit (*Conflict*)	6. Mon ami(e) et moi on se fâche l'un(e) contre l'autre. *(My friend and I get mad each other).* 12. Mon ami(e) et moi on se bagarre. *(My friend and I fight).* 18. Mon ami(e) et moi on se dispute. *(My friend and I have arguments).*

3   *Note.* Instructions: "Please respond to the questions with one person in mind, your best sport friend.
4   Write the best sport friend in allotted space before proceeding with the question".
5

1   Table 2

2   *Goodness-of-Fit for the SFQS-FR Models[a].*

Model[b]	χ^2 (B-S)	df	CFI	TLI	RMSEA	RMSEA 90% CI	ECVI	AIC
1	255.2*	194	.922	.907	.060	.053-.066	1.429	601.6
2	277.9*	208	.816	.796	.088	.082-.094	2.319	976.2
3	245.8*	188	.941	.927	.053	.046-.060	1.277	537.6

3   *Note.* Model 1: Six correlated first-order factors (Weiss & Smith. 1999); Model 2: A two-factor
4   model (Weiss & Smith, 2002); Model 3: Seven correlated first-order factors (McDonough & Crocker,
5   2005); χ^2 (B-S): Bollen-Stine chi-square; df: Degrees of freedom; CFI: Comparative Fit Index;
6   TLI: Tucker-Lewis Index; RMSEA: Root Mean Square Error of Approximation; RMSEA 90% CI:
7   Root Mean Square Error of Approximation 90% Confidence Interval; ECVI: Expected Cross-
8   Validation Index; AIC: Akaike's Information Criterion; [a] Bootstrapped goodness of fit indexes are
9   reported in this table because of the significant multivariate non-normality within these data; [b] n = 425;
10   * $p < .01$.
11

1 Table 3

2 *CFA Standardized Factor Loadings and Uniquenesses for Model 1 (Weiss & Smith,*

3 *1999), Model 2 (Weiss & Smith, 2002) and Model 3 (McDonough & Crocker, 2005).*

Scales	Item n°	Models				
		1		2		3
		Load^a(Uniq)	Scales	Load^a(Uniq)	Scales	Load^a(Uniq)
Self-esteem Enhancement and Supportiveness	1	.67 (.37)†		.56 (.20)†	Self-esteem enhancement and supportiveness	.66 (.37)†
	7	.68 (.40)		.58 (.44)		.68 (.40)
	14	63 (.52)		.59 (.49)		.64 (.52)
	22	.72 (.34)		.65 (.57)		.70 (.35)
Loyalty and Intimacy	2	.66 (.40)†		.59 (.40)	Loyalty	.73 (.32)†
	20	.73 (.61)		.64 (.57)		.80 (.43)
	8	.60 (.55)		.58 (.64)	Intimacy	.63 (.50)†
	13	.79 (.50)		.72 (.45)		.78 (.51)
Things in Common	3	.69 (.49)†	Positive friendship	.57 (.73)	Things in Common	.69 (.50)†
	9	.74 (.50)		.64 (.63)		.75 (.50)
	15	.60 (.71)		.51 (.86)		.59 (.73)
	19	.77 (.41)		.67 (.83)		.76 (.41)
Companionship and Pleasant Play	4	.68 (.31)†		.58 (.56)	Companionship and Pleasant Play	.67 (.31)†
	10	.75 (.21)		.63 (.38)		.74 (.21)
	17	.67 (.26)		.63 (.29)		.66 (.26)
	21	.74 (.32)		.69 (.28)		.75 (.32)
Conflict Resolution	5	.53 (.53)†		.47 (.38)	Conflict Resolution	.53 (.53)†
	11	.75 (.46)		.59 (.58)		.74 (.46)
	16	.81 (.43)		.58 (.68)		.81 (.43)
Conflict	6	.81 (.39)†	Conflict frienship	.81 (.84)†	Conflict	.81 (.38)†
	12	.45 (.92)		.46 (.40)		.46 (.92)
	18	.81 (.48)		.82 (.91)		.82 (.48)

4
5 *Note.* Load: loadings; Uniq: uniquenesses. 1: Six correlated first-order factors (Weiss &
6 Smith, 1999); 2: A two-factor model (Weiss & Smith, 2002); 3: Seven correlated first-order
7 factors (McDonough & Crocker, 2005). †: items fixed to 1.0. ^{a}All loadings and uniquenesses
8 are significant ($p < .01$).
9

1   Table 4

2   *Descriptive Statistics for Model 3 (McDonough & Crocker, 2005).*

	Scales						
	Self - esteem	Loyalty	Intimacy	Things in Common	Companionship and Pleasant Play	Conflict Resolution	Conflict
M	4.15	3.97	4.31	3.82	4.43	4.03	1.90
SD	.85	1.04	.97	1.02	.74	1.00	1.11
ρ	.82	.72	.75	.88	.88	.76	.70
α	.77	.72	.68	.79	.80	.74	.73
ICC	.72*	.72*	.72*	.79*	.80*	.73*	.72*
ICC 95% CI	.73 - .80	.67 - .77	.67 -.77	.76 - .82	.76 -.83	.68 - .77	.67 - .76
Student t(105)[tt:a]	-.49	-1.45	-1.48	-1.10	-.69	-.62	-.18

3   *Note*. M: Mean; SD: Standard deviations; ρ: Composite reliability estimate;
4   α : Cronbach's alpha; ICC: Intraclass correlation coefficient; ICC 95% CI: Intraclass
5   correlation coefficient 95% confidence interval; Student t[tt]: Student *t* test; *p < .05; [a]All
6   Student *t* tests are non-significant (p > .05).

7

8

9

1 Table 5

2 *Intercorrelations and Standard Error of Correlation for Model 3 (McDonough & Crocker,*

3 *2005).*

Subscales	1	2	3	4	5	6	7
1. Self-esteem	_						
2. Loyalty	.86* (.04)	_					
3. Intimacy	.59* (.03)	.81* (.03)	_				
4.Things in Common	.74* (.04)	.69* (.04)	.59* (.03)	_			
5. Companionship and PleasantPlay	.72* (.03)	.74* (.03)	.80* (.03)	.76* (.03)	_		
6. Conflict Resolution	.66* (.04)	.80* (.04)	.59* (.04)	.56* (.04)	.58* (.03)	_	
7. Conflict	-.42* (.04)	-.33* (.04)	-.18* (.03)	-.36* (.04)	-.25* (.03)	-.43*(.05)	_

4 *Note*. Intercorrelations and (standard error of correlation); *$p <.05$.

5

6

Table 6

Goodness-of-Fit indexes ? of Factorial and Latent Mean Invariance Tests across Gender for Model 3 (McDonough & Crocker, 2005)[a].

	Model	χ^2 (B-S)	χ^2 (ML)	df	p	CFI	TLI	RMSEA	RMSEA 90% CI	ECVI	AIC	Comparison model	$\Delta\chi^2$ (ML)	Δdf	Δp	$\Delta\lvert$CFI$\rvert$	$\Delta\lvert$RMSEA$\rvert$
	Girls[b]	244.8	306.6	188	.001	.937	.922	.055	.044-.066	2.119	436.6	-	-	-	-	-	-
	Boys[c]	243.3	327.1	188	.001	.930	.915	.059	.067-.087	2.116	457.1	-	-	-	-	-	-
1	Dimensional (no invariance)	501.3	731.8	376	.001	.908	.887	.047	.042-.053	2.362	991.8	-	-	-	-	-	-
2	Metric (λ equal)	519.9	742.0	391	.001	.910	.893	.046	.041-.051	2.314	971.6	1	10.1	15	NS	.002	.001
3	Strong (τ equal)	534.4	780.8	406	.001	.903	.890	.047	.042-.052	2.545	1068.8	2	38.8	15	S	.007	.000
4	Partial strong (τ_{12} free)	533.5	762.8	405	.001	.908	.895	.046	.041-.051	2.507	1052.7	2	20.8	14	NS	.002	.000
5	Partial Strict (τ_{12} and δ_{12} free	575.9	859.7	426	.001	.888	.879	.049	.044-.054	2.637	1107.7	4	96.9	21	S	.020	.003
6	Partial Strict (τ_{12}, δ_6, δ_8, δ_{12}, δ_{13}, δ_{14}, δ_{15}, δ_{18}, δ_{20}, and δ_{21} free)	560.9	783.6	418	.001	.906	.896	.046	.041-.051	2.495	1047.8	4	20.8	13	NS	.002	.000
7	Equal factor means	568.1	809.8	425	.001	.901	.892	.046	.042-.051	2.523	1059.8	6	26.2	7	S	.005	.000

Note. τ: Intercept; δ: Uniqueness; χ^2 (B-S): Bollen-Stine chi-square; df: Degrees of freedom; CFI: Comparative fit index; TLI: Tucker-Lewis index; RMSEA: Root mean square error of approximation; $\Delta\chi^2$: Change in goodness-of-fit χ^2; Δdf: Change in degrees of freedom; ΔCFI: Change in comparative fit index; ΔRMSEA: Change in root mean square error of approximation; RMSEA 90% CI: Root mean square error of approximation 90% confidence interval; ECVI: Expected cross validation index; AIC: Akaike's information criterion; [a] Bootstrapped goodness of fit indexes are reported in this table because of the significant multivariate non-normality within these data; [b] n = 207; [c] n = 215;* $p < .01$

Table 7

Goodness-of-Fit indexes of Factorial and Latent Mean Invariance Tests across Age Categories for Model 3 (McDonough & Crocker,

2005) [a].

	Model	χ^2 (B-S)	χ^2 (ML)	df	p	CFI	TLI	RMSEA	RMSEA 90% CI	ECVI	AIC	Comparison model	$\Delta\chi^2$ (ML)	Δdf	Δp	Δ|CFI|	Δ|RMSEA|
	11-13 years [b]	247.8	306.1	188	.001	.900	.877	.069	.055-.083	3.330	436.2	-	-	-	-	-	-
	14-18 years [c]	247.6	358.3	188	.001	.933	.918	.056	.047-.065	1.690	488.3	-	-	-	-	-	-
1	Dimensional (no invariance)	501.7	664.9	376	.001	.923	.905	.043	.037-.048	2.202	924.9	-	-	-	-	-	-
2	Metric (λ equal)	519.1	677.9	391	.001	.923	.909	.042	.036-.047	2.162	907.9	1	132	15	NS	.000	.001
3	Strong (τ equal)	534.5	693.3	406	.001	.923	.913	.041	.036-.046	2.336	981.21	2	15.4	15	NS	.000	.001
4	Strict (δ equal)	578.4	733.7	428	.001	.918	.912	.041	.036-.046	2.328	977.7	3	40.4	22	S	.005	.000
5	Partial Strict (δ_{10} free)	575.6	725.1	427	.001	.920	.914	.041	.036-.046	2.312	971.1	3	31.8	21	NS	.003	.000
6	Equal factor means	583.0	739.5	434	.001	.918	.913	.041	.036-.046	2.313	974.5	5	14.4	7	NS	.002	.000

Note. τ: Intercept; δ: Uniqueness; χ^2 (B-S): Bollen-Stine chi-square; df: Degrees of freedom; CFI: Comparative fit index; TLI: Tucker-Lewis index; RMSEA: Root mean square error of approximation; $\Delta\chi^2$: Change in goodness-of-fit χ^2; Δdf: Change in degrees of freedom; ΔCFI: Change in comparative fit index; ΔRMSEA: Change in root mean square error of approximation; RMSEA 90% CI: Root mean square error of approximation 90% confidence interval; ECVI: Expected cross validation index; AIC: Akaike's information criterion; [a] Bootstrapped goodness of fit indexes are reported in this table because of the significant multivariate non-normality within these data; [b] n = 132; [c] n = 290;* $p < .01$