**Title:** Peer relationships and quality of life

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**Abstract**

Aims

Social interactions play an important role in our everyday life and thus, it might have an impact on what could be defined as “a good life”. Findings from existing studies on children’s quality of life (QoL) have shown that peer relations are associated with both positive and negative outcomes. Positive aspects of peer relations, and especially friendship, are considered to promote one’s QoL, while negative aspects decrease children’s QoL. The overall aim of current study was to examine associations between peer relations (popularity and friendship) and children’s QoL (participants´ age 11-12 years old). The present study focuses on quantitative components of popularity and friendship, more specifically, number of nominations. Hence, popularity defines to what degree the child is liked by peers, whereas reciprocal friendship occurs when two children mutually nominate each other as friends.

Methods

This study was based on data collected for a larger ongoing research project – “The Health Oriented Pedagogical Project” (HOPP). HOPP is a longitudinal intervention study with multi-informant and multi-method design. At the baseline in 2015, a total number of all pupils in all schools was 2817, where 2297 (82%) participated in the project. Due to design and its aims, the research sample of the present study consisted of 691 participants. QoL variable was measured using the Norwegian version of the Inventory of Life Quality in Children and Adolescents (ILC). Popularity and friendship variables were based on number of nominations and represent quantitative features of peer relationships.

Results

Both popularity and reciprocal friendship had a positive association with children’s QoL. Number of nominations (both for popularity and reciprocal friendship) played a significant role for mentioned above associations. Consequently, popularity (β=0.18) and reciprocal friendship (β=0.25) were associated with children´s QoL with 95% CIs [0.12, 0.27], and [0.17, 0.31] respectively.

Conclusion

Findings from the current study contribute in contemporary research focused on children’s QoL. Identifying ranking of reciprocal friendships, and the finding that more than one reciprocal friendship increase QoL is important and could be beneficial for developing programs promoting high QoL and hence preventing possible maladjustments in a long-term perspective.

**Keywords**

Peer relationships – quality of life – middle childhood – popularity – reciprocal friendship

**Background**

Social interactions are fundamental for our development and vital for our existence. It is reasonable to assume that social interactions play a significant role in what could be characterized as “a good life”. Norwegian Department of Health [1] defines “QoL” in a similar way as “subjective experience of feeling good” (about one’s life). Indeed, numerous studies have shown that social relationships play an important role for self-reported well-being [e.g. 2-4]. It is well established that peer relations are important to social, cognitive and emotional development of children, youth, and adults. Research suggests that peer relations influence children on individual, intrapersonal and general adjustment [4]. Transitioning into school, children become concerned about being liked by peers and belonging to a group of peers [e.g. 3], this feeling of belonging and the need to form meaningful friendships increases in middle childhood to preadolescence [3,4]. Another important factor is that elementary school is compulsory for everyone, and children spend on average 5-6 hours per day at school. Therefore, if school environment is unfortunate in terms of social interactions, it might have a significant impact on children’s perception of the overall QoL.

The current study examines associations between peer relations (popularity and friendships) and QoL with a specific focus on 11-12 year old children. To date research on peer relationships and QoL has usually focused on adolescents or young adults, thus less is known about such association in middle childhood [e.g. 2]. In addition, most research examining children’s QoL focuses on children with various physical or psychological impairments, i.e. cancer [5], obesity [6], or ADHD [7]. It was not until more recent that an emerging number of studies started to focus on QoL in children from general population [e.g. 2, 4]. The current study contributes to the latter by examining associations between popularity, friendship and children’s self-reported QoL among a representative normal sample of children.

Popularity and friendships are two related phenomena, but are also distinct and separate, and cannot substitute one another [8-11]. Friendship is often described as voluntary and mutual with emphasis on emotional connection between friends [e.g. 10,12,13]. Other researchers point out that this assumption about its mutuality is misleading, as not all friendships are reciprocal by default. That is why they distinguish between reciprocal and unilateral friendships [e.g. 14, 15]. The latter type of friendship occurs when a child consider another person as a friend but does not get a reciprocated nomination in return [16]. Popularity, on the other hand, is a phenomenon describing to what degree a child is liked by his/her peers. Fink et al. [11] found that friendship and popularity were different phenomena where 53% of children who had low popularity scores had a reciprocal friend while 23% of children with high popularity status had no reciprocal friend.

**Peer relationships and quality of life**

Traditionally, research primarily focused on the negative consequences related to peer relationships (e.g. peer rejection, bullying, victimization), however, for the past two decades there has emerged a body of research where the emphasis started to shift from focusing on dysfunctional outcomes to promoting positive aspects of peer relationships [3, 4].

Nevertheless, peer relations have been found to have both positive and negative outcomes on one´s QoL where positive aspects of peer relations, and especially friendships, are considered to promote positive adjustment [e.g. 3, 4, 17], while negative aspects decrease children’s QoL [e.g. 4, 18-20]. These outcomes might have a long-term effect on children´s adjustment and development [e.g. 4, 10, 21].

Research on the associations between one’s QoL and popularity have been somewhat inconsistent: most of researchers report low to moderate positive associations between popularity and QoL [22, 23], while others find negative associations, where not popularity but rather a desire to be popular were associated with poorer self-realization, lessened happiness, and anxiety, and each of these factors might decrease person´s QoL [24], yet some report that there is no direct associations at all [25]. Such inconsistency might be due to different age groups as a research sample, or the use of different measurements. To date research on peer relationships and QoL has usually focused on either adolescence or young adults, thus less is known about such association in middle childhood [e.g. 2]. The present study targeted the age range from age 11 to 12 years. This is an important addition to the existing literature focused on associations between QoL and peer relationships.

Many studies have confirmed that friends represent an important domain of children’s QoL [e.g. 21, 26, 27]. Number of friends was reported to be one of the factors predicting higher level of reported life satisfaction [22, 28]. Having at least one friend has been found to promote prosocial behavior and positive adjustment [26, 27, 29]. In line with this notion, other studies emphasize in addition that having a friend is especially important for those who are at risk for maladaptation [30]. A lack of friends is associated with various mental health challenges and problems, which in its turn tend to decrease QoL [3]. Children who had two or more close friends reported higher level of happiness as compared with children who had only one or no close friends [31]. This is in contrast to findings from Hodges et al. [18] study suggest that there is no difference in children’s adjustments if they have only one friend or many.

**The present study**

The main objective of the present study was to examine associations between popularity and friendships and children’s self-reported QoL. Second, we examined whether the differences in number of popularity or friend nominations were related to differences in children´s reported QoL. Of specific interest in this regard was the question of whether those who have at least one friend report higher QoL as compared to children with no friends. The current sample represented a normal community-based population sample with the age range from 11 to 12 years old.

**Methods**

The current study was based on data collected for a larger longitudinal research project – “The Health Oriented Pedagogical Project” - HOPP [32]. The main goal of the project is to examine the effect of increased physical activity as a part of the pedagogical approach (both from health related and academic perspectives).

**Design, data collection and participants**

HOPP was designed as a case-control physical activity intervention in all (seven) elementary schools in the Horten municipality, Vestfold County, Norway and two control schools in Akershus County, Norway. The study has a multi-informant and multi-method design. At the baseline in 2015, a total number of all pupils in all schools was 2817, where 2297 (82%) participated in the project. Children from 1st to 6th grade were recruited to participate in the project. Participation in the project required a written parental consent. At the same time participants were able to withdraw from the study at any stage of data collection with no explanation needed. All participants are followed longitudinally from baseline in spring 2015 for as long as they stay in elementary school (2015-2021) [32].

HOPP is a multi-method project including computer-based questionnaires and physiological and academic tests. Data collection is administrated at local school settings each year. All questionnaires and tests are conducted by trained research assistants.

Data in the current study represent data gathered during the second year of data collection (2015-2016), because the information about friendship and its variables, The Strength and Difficulties questionnaire (SDQ), and The Self-Perception Profile for Adolescents (SPPA) had not yet been included at the baseline of the project. Due to the project design, some tests are limited to certain age groups [32]. Thus, project design and our interest in peer relations excluded all children from 2nd to 5th grade in all school participating in the project. In other words, the research sample of the present study consisted of 691 participants (345 girls) out of 957 pupils that were enrolled in 6th and 7th grade at those schools at that time. The majority of the children were 12 years old (70.1%), the others - 11 years. In addition, pupils´ parents provided information about their education and most of them (59.2% of mothers and 53.8% of fathers) had at least a bachelor degree, even though 20-21% of the parents didn’t provide any information about the level of their education.

**Measures**

*Quality of life (QoL)* was measured using the Norwegian version of the Inventory of Life Quality in Children and Adolescents (ILC) [33-35]. Children reported on seven items addressing different aspects of QoL: school, family, social integration, interests and recreational activities, physical health, mental health, and global QoL item. Each item is rated on a 5-point scale from 1 – ”very good” to 5 – ”very bad” using ”smiley” icon as an anchor. The mean score was calculated, and items were reversed coded if necessarily in such a way that the higher the mean score, the higher reported QoL. Children used computers in the school setting to answer questions. Norwegian version of ILC showed good internal consistency (α =.66) which corresponds with what had been reported before [35]. Previous studies examining the psychometric properties of the Norwegian version of ILC where research sample of children represented normal population report satisfactory norms and measures of its validity and reliability [34, 35]. The Norwegian adaptation of the ILC was translated by Jozefiak and Linnemann in 2008 and was based on an original German ILC version [33].

*Friendship and popularity variables.* Information about children’s friends had been accessed by using a modification of the ”The Bus Story” procedure developed by Perren and Alsaker [36]. Children were given the following instruction: ”You are going on a trip. Whom of your friends from your class could you think of inviting with you?” According to the instruction, they could nominate up to five friends from the class (both girls and boys), but children actually nominated no more than four friends.

Friendship and popularity ranking was examined by different procedures to investigate the meaning of popularity, directionality and reciprocity of the nominations. All produced variables required manual scoring - looking at each child’s response one by one and counting for each nomination and its directionality within one class.

Based on procedures from previous studies [23, 27], a sum score of the number of nominations was used for each child in order to compute a *popularity variable*. It varied from 0 to 9 nominations. In the next step reciprocal friendship variable was computed. It was counted as a *number of reciprocal friend nominations*. By analyzing children’s popularity nominations we were able to detect directional links between nominated children and the child who nominated those children as his/her friends and whether those links were reciprocal or not, and if they were reciprocal then to what degree (e.g. if one child nominated another child as number 1, and whether this nomination ranking was reciprocated). As a result, the following scale had emerged: ‘0’ for those who didn’t have any reciprocal friend nominations, ‘1’ meant that the child got 1 reciprocal scoring back from those who had been nominated by him or her, ‘2’ indicated that 2 out four nominated friends nominated him or her as a friend as well, ‘3’ – the child was nominated back as a friend by 3 out 4 of his/her friends on the list, finally, ‘4’ means an absolute reciprocal match as it describes the situation when the child was nominated as a friend by all the children that he or she nominated as friends.

*Control variable*. All children provided the information about their age and gender. In addition, both mothers and fathers were asked about their level of education that had been coded in 4 categories: elementary school (1), high school (2), university degree up to 3 years (3), and university degree 4 years and more (4).

**Statistical analysis**

All analyses were computed using IBM SPSS Statistics, version 22. First, we examined bivariate correlation for the study variables. Second, we examined whether popularity and number of reciprocal friends predicted quality of Life (QoL) using hierarchical linear regression analysis. A hieratical regression analyses was selected in order to examine the main predictor association on quality of life, and secondly to examine whether this effect was robust above and beyond possible control variables. Potential confounders controlled in the analyses were age, gender and parents’ level of education. Finally, we examined whether there were any statistically significant differences in reported QoL between groups of children with different popularity scores and reciprocal friend nominations, using One-Way analyses of variances (ANOVA). Children were grouped according to their popularity score and in order to analyze as even groups as possible (in terms of a group size) those who had 6 and more nominations were merged into one group.

**Results**

Table 1. *Descriptive features of the sample*

|  |  |  |
| --- | --- | --- |
| Variables | Mean | SD |
| 1. Quality of life | 4.44 | .41 |
| 2. Popularity nominations | 3.08 | 2.00 |
| 3. Number of reciprocal nominations | 1.81 | 1.20 |
| 4. Age (in years) | 11.70 | .46 |
| 5. Gender | .50 | .50 |
| 6. Maternal education | 3.00 | .76 |
| 7. Paternal education  | 2.94 | .81 |

**Bivariate correlation analyses**

Prior to the main analyses, the bivariate correlations between variables had been examined (Table 2). Bivariate correlations showed a moderate positive association between QoL and popularity. Popularity, number of reciprocal nominations, as well as father´s level of education was all positively associated with QoL. Reciprocal friend nominations, were found to be strongly and positively associated with QoL,

Table 2. *Correlations Between Variables*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Variables: | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1. QoL | - |  |  |  |  |  |  |
| 2. Popularity | **.20\*\*** | - |  |  |  |  |  |
| 3. Number of reciprocal nominations | **.24\*\*** | **.74\*\*** | - |  |  |  |  |
| 4. Education (mother) | .08 | .06 | .04 | - |  |  |  |
| 5. Education (father) | **.16\*\*** | **.13\*\*** | **.16\*\*** | **.46\*\*** | - |  |  |
| 6. Gender | .02 | .03 | **.07\*** | **.10\*** | **.10\*** | - |  |
| 7. Age | .02 | .06 | .05 | .06 | .01 | .03 | - |

*Note*. bold type \*p < 0.05, \*\*p < 0.01

**Quality of life and popularity**

*1. Hierarchical linear regression analyses*

When examining whether popularity predicted QoL, hierarchical linear regression analyses showed that popularity nominations significantly predicted higher QoL. The association remained significant after controlling for potential confounders. Paternal education was also significantly associated with QoL.

Table 2. *QoL Predicted by Popularity Variable*

|  |  |  |
| --- | --- | --- |
| Variables | Model 1 (N=691) | Model 2 (N=465) |
| **B** | **SE** | **Beta** | **95%CI** | **B** | **SE** | **Beta** |
| Popularity | .04 | .01 | **.18\*\*** | .12-.27 | .03 | .01 | **.16\*\*** |
| Age |  |  |  |  | -.01 | .04 | -.01 |
| Gender |  |  |  |  | -.03 | .04 | -.03 |
| Education (mother) |  |  |  |  | -.01 | .03 | -.01 |
| Education (father) |  |  |  |  | .08 | .03 | **.15\*\*** |
| R square | **.03\*\*** |  |  |  |  **.06\*** |  |  |

*Note.* Bold type \*p < 0.05. \*\*p < 0.01

*2. One-way ANOVA*

A one-way between subjects ANOVA was conducted to compare the effect of popularity on children's QoL in having no nominations, having one, two three, four, five and six and more nomination conditions. There was a significant effect of popularity on QoL at the p < 0.001 level for the seven conditions [F(6,684)=5.63, p<0.0001].

Figure 1. *Mean Level of Reported QoL by Number of Popularity Nominations*

Post hoc comparisons using the Bonferroni test indicated that the mean score for being unpopular (no nominations at all) condition was significantly different from any other condition (except for having two nominations).

**Quality of life and reciprocal friendship**

*1. Hierarchical linear regression analyses*

When examining whether number of reciprocal nominations could predict QoL, hierarchical regression analyses showed that number of reciprocal nominations significantly predicted higher QoL reported by children. The association remained to be significant after controlling for potential confounders. Paternal education was also significantly associated with QoL.

Table 3. *QoL Predicted by Number of Reciprocal Nominations*

|  |  |  |
| --- | --- | --- |
| Variables | Model 1 (N=691) | Model 2 (N=465) |
| **B** | **SE** | **Beta** | **95%CI** | **B** | **SE** | **Beta** |
| Reciprocal friend nominations | .08 | .01 | **.25\*\*** | .17-.31 | .08 | .02 | **.23\*\*** |
| Age |  |  |  |  | -.01 | .04 | -.01 |
| Gender |  |  |  |  | -.03 | .04 | -.04 |
| Education (mother) |  |  |  |  | .01 | .03 | .01 |
| Education (father) |  |  |  |  | .07 | .03 | **.13\*\*** |
| R square | **.06\*\*** |  |  |  | **.08\*** |  |  |

*Note.* Bold type \*p<0.05. \*\*p<0.01

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*2. One-way ANOVA*

A one-way between subject ANOVA was conducted to compare the effect of number of reciprocal friends on children's QoL in having no reciprocal friend, having one, two three or four reciprocal friends conditions. There was a significant effect of number of reciprocal friends on reported QoL at the p < 0.001 level for the five conditions [F(4, 693)=11.34, p < 0.0001].

Figure 2. *Mean Level of Reported QoL by Number of Reciprocal Nominations*

Post hoc comparisons using the Bonferroni test indicated that the mean score for having no reciprocal friend condition was significantly different than having two, three or four reciprocal friends conditions, while having one reciprocal friend condition didn’t differ significantly from having no reciprocal friend condition. Level of quality of life didn’t differ between groups of children close to each other in number of nominations (one nomination higher or lower), except four reciprocal nominations. Having four reciprocal friends condition was significantly different from all other reciprocal friend conditions.

**Discussion**

There were two main findings: First, both popularity and reciprocal friendship were associated with self-reported QoL. Second, interestingly the number of nominations (both for popularity and reciprocal friendship) played a significant role for higher quality of life.

**Quality of life and popularity**

A moderate-weak, but positive association was found for popularity and children’s QoL, which is similar to previous studies [e.g. 22, 23]. Although, the main tendency was that QoL increased with the number of popularity nominations, the findings also suggest that the social status i.e. popular versus unpopular, rather than the number of nominations, was associated with higher levels of QoL. That is, the findings suggests that not getting any nominations from their peer, were associated with lower self-reported QoL. This may reflect the fact that not belonging to any group of peers in your school may be a risk for poor adjustment. During middle childhood interactions with peers start to play an important role in one´s life [4]. Thus, not being able to establish successful interactions with peers could influence child’s perception of his/her life. However, the number of nominations does not seem to play an important role, even though overall tendency for reported QoL increases with number of nominations (except for two and six and more nominations). The implication is that being liked by at least one peer is important for children’s perceived quality of life, however this does not necessarily mean that being ranked as highly popular will increase the sense of quality of life.

**Quality of life and reciprocal friendship**

Similarly to other studies, a moderately weak positive association was found for reciprocal friendship and QoL [e.g. 2, 21]. Findings in the current research suggest that children with reciprocal friends tend to report higher QoL compared to those without friends. Specifically, the bigger the difference in the number of friends, the greater the difference in QoL scores. However, in contrast to popular beliefs that having at least one reciprocal friend is considered to promote children’s adjustment and QoL [27, 30], our finding suggests that although those who did not have any reciprocal friends in their class, reported the lowest level of QoL we also found that children with no friends did not differ in QoL from those with one reciprocal friend. This particular finding contradicts what has been reported before, as findings from the present study suggest that for the level of QoL having at least two mutual friends in the class was important as compared to those with no friends. Thus, our findings add to the current literature in showing that the number of reciprocal friendships was associated with higher perceived QoL. This finding may reflect that having more than one reciprocal friend adds a certain sense of security, as friends are considered to be a resourceful asset in terms of providing assistance and support and promoting the development of necessary social skills. They are also important for affect regulation and constructive conflict resolution [4]. In fact, our finding showed that children who got a full match on reciprocal friendship nominations reported the highest level of QoL, and it was significantly different from any other number of reciprocal nominations, Therefore, it is reasonable to assume, that with the increased number of mutual friends the chance that children’s needs for social interactions and belonging to a group of peers are also met. Such fulfillment might consequently influence positively child’s perception of QoL. However, it is worth to mention, that participants in this study were children from normal population and both children who are disliked by their peers and children with no reciprocal friends in the class evaluated on average their QoL as ”good”. Results from this study also suggest that both popularity and reciprocal friendship were not strong predictors of QoL, indicating that there exist other variables, not measured in this study, contributing to the children’s QoL.

Strength of the current study is the use of a large representative sample. The data was collected from a normal population of children and not a clinical subgroup, thus generalization to normal population may be anticipated, and has the potential to improve prevention of poor QoL, such that educational staff can focus on risks and protective factors to improve children’s perceived QoL. Moreover, this study also focuses on middle childhood, a developmental period where interactions with peers begin to be of great importance. Undoubtedly, it continues to develop during adolescence and adulthood, but until recently middle childhood has been overlooked in regards with associations between peer relationships and QoL. Another strength of this study is the use of self-report, and to focus on children´s perspective on one´s QoL, and friendship and popularity was based on reciprocal nominations, which provide a novel and informative insight to bidirectional friendships rather than asking the child themselves on whether they have a friend or not. QoL as well as popularity and friendship represent phenomena strongly related to personal experiences and beliefs, where self-reports are considered to be the most adequate way to access such experiences [2]. A major strength of the current study is that there are actual counts of the number of nominations for each child as well as the directionality of nominations is detected (i.e. reciprocity) as compared to other studies that had only one question about number of friends and just assumed reciprocity of the friendship without verifying it [22]. Thus, the current study provides a unique perspective, not only by examining associations between friendship and QoL, but specifically, investigating the role of friendship’s reciprocity for children’s QoL.

Against that background,some limitation should be mentioned. First, our study focused solely on quantitative components of popularity and friendship and how they relate to QoL. Thus, other factors, like friendship quality and family relationships, which have been suggested by other researchers as core factors for one´s QoL [21, 36], were excluded. Moreover, the current digital age opens unlimited possibilities to maintain and develop social relationships on-line. Internet-based interactions show positive correlation with positive friendship experiences both online and offline [2, 16]. Thus, those who might experience challenges in establishing successful interactions with peers at school might benefit from on-line ones. However, this study was limited to focus on nominations related to peers at school. Also, both popularity and friendship variables were co-depended on answers of classmates. Therefore, missing by itself could lead that popularity and reciprocal friendship scoring would not reflect the actual social interactions within the class. In addition, the study sample is cross-sectional, and therefore, the directionality of the associations is not known. It also implies that the scores in the QoL are more likely to reflect the short-term QoL tied to the situation there and then. Thus the question whether the QoL is stable over time remains to be answered by future research.

To sum up, the current study is novel and interesting and contributed to the current literature with examining associations between QoL and peer relations, more specifically, popularity and reciprocal friendship during middle childhood. School settings seem like a perfect place in implementing the interventions based on the current and previous research. Findings suggest the number of popularity nominations was not as important as being liked by one of classmates. On the contrary, number of reciprocal friend nominations played a significant role in QoL. Identifying ranking of reciprocal friendships, and the finding that more than one reciprocal friendship increase QoL is important and could be beneficial for developing programs promoting high QoL and hence preventing possible maladjustments in a long-term perspective. We suggest that school settings could be a perfect place to implement such programs.

**Abbreviations**

HOPP – The Health Oriented Pedagogical Project

ILC - Inventory of Life Quality in Children and Adolescents

SPSS – Statistical Package for Social Science

QoL – Quality of life

**Declarations**

 **Competing interests**

The authors declare that they have no competing interests.

**Ethics and consent to participate**

The Regional Committees for Medical and Health Research Ethics approved the study protocol (2014/2064/REK sør-øst). The approval date was the 9th of January, 2015. The study is registered in Clinical trials (ClinicalTrials.gov Identifier: NCT02495714).

All children included in the study provided a written parental consent. At the same time participants were able to withdraw from the study at any stage of data collection with no explanation needed.

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