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**Participation in Sports Activities Increases Life Satisfaction among Adolescents, with
Loneliness as a Mediator**

Master's of Science (MSc) Youth Studies
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Abstract

Participating in sport activities gives adolescents the opportunity to socialize and interact with other individuals. With more interaction, there could be feelings of less loneliness and higher life satisfaction. This research aimed to examine the mediating effect of loneliness between participating in sports activities and life satisfaction among adolescents. The present study based its findings on data collected in three waves from the YOUth Got Talent project. There was a total of 219 participants in this study, 55.7 % females and 41.3% males, with a mean age of 17.8. Single item of whether the participants were involved in a sports club was used to assess the participation in sports activities variable. The UCLA Loneliness Scale was used to assess for loneliness, and adaptation of Cantril Ladder's Life Satisfaction Scale was used to assess life satisfaction of the participants. Results showed that participation in sports activities did not significantly predict life satisfaction among adolescents, and participation in sports activities did not significantly predict loneliness. Loneliness significantly predicted life satisfaction. However, there was no mediation effect found for loneliness between participation in sports activities and life satisfaction.

Keywords: life satisfaction, loneliness, sports activities, adolescents

Introduction

Adolescence is a stage in life that is characterized by constant change, whether it be biological, psychological or social change. It is a crucial time period that links childhood and adulthood. The experiences and interactions that take place in this stage of life provides an environment of trial and error for not only the overall growth of the adolescent but also the opportunity to shape their future selves (Izaguirre et al., 2021).

According to Erik Erikson's psychosocial development stage, adolescents at this stage of their life go through the 'identity versus role confusion' developmental period, here they are focused on the question of "Who am I?" and "What should I do with my life?". In this developmental stage, children need the continuous support and encouragement of significant others to help them achieve an adequate sense of self and become independent of others (Maree, 2021). Hence social interaction, in this phase of life is prominent in determining the one's identity for the present and the future.

In an attempt to understand oneself, amidst the constant change within and around the environment, there may be instances where one is not satisfied with their present life and strive for more or greater change. Here lies the relevance of assessing life satisfaction among adolescents. Life satisfaction, which is the evaluative judgment of one's life and is a key indicator of subjective well-being (Kekkonen et al., 2020), is important to assess during adolescence to help predict future well-being. Assessing life satisfaction of adolescents also provides us with the opportunity of analysing different social and psychological factors of individuals, for instance, it was also found that adolescents who have higher life satisfaction, report more positive social relationships, greater job satisfaction and productivity, lower levels of psychopathology (Lewis et al., 2011), higher extraversion and social self-efficacy, and is found to negatively correlate with neuroticism (Proctor et al., 2009).

To assess for and aim for higher life satisfaction among adolescents, one crucial predicting factor is loneliness (Chipuer et al., 2013). Loneliness, that is described as a subjective discrepancy between one's actual and aspired level of social relationships (Perlman & Peplau, 1981), becomes a more prominent aspect of adulthood and old age, yet it is pertinent and peaks even during adolescence (Bayat et al., 2021). Loneliness can contribute to a constellation of physical and psychiatric dysfunctions and/or psychological risk factors including depressive symptomatology, alcoholism, suicidal thoughts, aggressive behaviours, social anxiety, and impulsivity (Cacioppo et al., 2015). All these factors can dangerously

affect an adolescent's overall subjective wellbeing and life satisfaction, and is hence crucial to assess and examine early in life, in order to ensure a more resilient future.

One possible way to tackle loneliness and its repercussion on life satisfaction, is through more social interaction. Social interaction for adolescents takes place within the classroom, school ground, social gatherings, and in their individual neighbourhoods. Another form of social interaction is participating in sports activities. It has been found that participation in organized sport activities can benefit adolescents when it comes to mental health, life satisfaction, and physical health (Badura et al., 2015).

Life satisfaction is an integral part of positive psychology (Proctor et al., 2009) that can help us understand the important emotional, social and behavioural growth of the youth. In order to study life satisfaction among adolescents, the main objective of the present research is to understand how increasing social interaction through participating in sports activities, via reducing feelings of loneliness, can increase life satisfaction among adolescents. Following are prior literature investigating the relation between participation in sports activities and life satisfaction, participation in sports activities and loneliness, and loneliness and life satisfaction among adolescents.

Participation in Sports Activities and Life Satisfaction

The social identity theory provides an understanding of how team identification can be associated with subjective well-being, including self-esteem and community cohesion (Inoue et al., 2017). When talking about team sports, an aspect of an individual's self-concept, identity, and worth is derived from the perceived membership they have in that social group, and having such feelings of belongingness and inclusion leads to a more positive outlook and meaning of life.

Additional to the social identity theory, literature was found regarding life satisfaction to be positively related to strenuous exercise, participation in club and group sports, and to be negatively correlated with anxiety, depression, psychophysiological symptoms, smoking, and alcohol use among Icelandic adolescents (Proctor et al., 2009). Social connectedness, social support, peer bonding, and increased life satisfaction can reduce stress, anxiety, and depression, and this reduction can further be enhanced by participation in organized sports (Eime et al., 2010).

Community sports clubs provide opportunities for social interaction through structured (organized and competitive) and unstructured (social) participation in sport (Eime et al., 2010). Clubs may work as social catalysts, leading to enhanced involvement and participation, with potentially greater physical and mental health benefits from participating

in club sports than from regular or any other physical activity (Eime et al., 2010). For example, in a study conducted to assess the contribution of participating in sports clubs on health-related quality of life, it was found that being active in a socially engaged manner, can contribute to mental well-being with improvements in health-related quality of life as well as life satisfaction (Eime et al., 2010).

Overall these findings suggest that participating in sports activities enhances a social, mental and physical healthy lifestyle that can increase the well-being or life satisfaction of individuals.

Participation in Sports Activities and Loneliness

As participating in sports activities require some form of social contact, being physically active, regardless of where the activity is performed, contributes positively to form closer interpersonal relationships and social bonds with their peers (Pinto et al., 2019). Such peer group membership and activity involvement are linked to identity exploration as well as a sense of belonging (Barber et al., 2001). In another research, during an investigation of loneliness among adolescents in Amazonas (Pinto et al., 2019), it was found that both physically inactive adolescents and those who do not participate in physical education classes are more likely to feel lonely compared to those who are active and participate regularly.

Studies that have examined the link between physical activity or sport participation and loneliness, have often reported to have an inverse relationship (Haugen et al., 2013). In this sense, sports participation can play a role in preventing or reducing feelings of loneliness by enhancing perceptions of social competence, elicited by positive peer relations, social recognition, and feelings of connectedness (Haugen et al., 2013).

Based on these previous findings, the present research predicts that the more an individual participates in sports activities, the more social bonding and connectedness takes place, leading to less feelings of loneliness. Hence, in this light, the present research predicts to find a direct link between participating in sports activities and loneliness.

Loneliness and Life Satisfaction

In a longitudinal study conducted by Kekkonen et al. (2020), it was found that a low frequency of meeting friends and loneliness in adolescence was associated with lower life satisfaction in young adulthood, especially among males. Whereas in females, not participating in recreational sports activities was associated with lower life satisfaction. Furthermore, it was found that loneliness emerged as significantly associated with quality of life for 29% of the measures reported by pre-adolescents, 86% of the measures reported by

early adolescents and, 57% of the measures reported by middle adolescents – in a study conducted on 464 adolescents in two rural towns in Australia (Chipuer et al., 2003).

Loneliness among children can be attributed to several reasons such as - deficiencies in the parent-child relationship, inability to form close intimate friendships, poor peer acceptance, and negative subjective evaluations of parent and/or peer relationships (Proctor et al., 2009). Ensuring that adolescents do not bare the repercussions of loneliness, which can cause social anxiety, depression, and public self-consciousness (Proctor et al., 2009), should be made a priority in order to prevent negative outcomes and correlations with happiness and life satisfaction.

It was observed that the quality of peer relations at the age of fifteen moderated life satisfaction thirty years later in middle-aged adults (Marion et al., 2013). Hence, the present research focuses on the link between loneliness and life satisfaction among adolescents, to help understand how to predict a better future for such individuals.

Gender Differences in Life Satisfaction, Loneliness and Participation in Sports Activities

Keeping all these different aspects in mind, gender plays a significant role in the participation of such activities and differences in the findings of life satisfaction and loneliness. In a meta-analysis of gender differences in life satisfaction among children and adolescents from 1980 to 2017 (Chen et al., 2020), showcased that life satisfaction remained invariant across gender groups. However, there was a slight difference in favor to male children and adolescents. This may have also been due to the notion that females disclose their negative emotions more frequently than males do (Chen et al., 2020).

Gender differences in sports participation or such physical activity, vary based on different studies. For example, in a study conducted on 368 Norwegian adolescents (Jakobsen & Evjen, 2018), it was found that females reported higher frequency in training during the week compared to males. In a Brazilian study, it was found that female adolescents were found to display greater motivation to participate in such activities in order to lose or maintain weight, whereas the males were motivated due to social and competitive factors related to vigor (Jakobsen & Evjen, 2018). Physical activity behaviour assessed in a cohort of Dutch youth, showed that adolescent females reported greater participation in moderate-intensity physical activity than boys, however, as it was not vigorous in nature male adolescents dominated the gender differences for such vigorous participation (Troost et al., 2002). Similarly, in a longitudinal study conducted in Germany, adolescent males reported

greater participation in total physical activity compared to female adolescents (Troost et al., 2002).

In another meta-analysis conducted (Maes et al., 2019), to examine gender differences in loneliness across the lifespan, it was found that males are slightly more likely to be lonelier than females. However, in this meta-analysis various theories were presented, yet specific reasoning for such findings were still debatable. In this aspect, as there are many varying gender differences with regard to life satisfaction, participation in sports activity, and loneliness, gender will be controlled for.

Current Study

Previous literature has demonstrated strong links between participating in sports and life satisfaction, as well as loneliness and life satisfaction. The main assumption of this research is that participating in sports activities can lead to lower feelings of loneliness and hence higher life satisfaction among adolescents. Previous literatures have not yet examined the collective effects of participating in sports activities, loneliness and life satisfaction among adolescents, and in this light, the current study proposes to examine loneliness as a possible mediator between participating in sports activities and life satisfaction among adolescents. Therefore, four hypotheses are proposed to fulfill the aim of this present study:

H1: Participation in sports activities predicts higher life satisfaction among adolescents

H2: Participation in sports activities predicts lower levels of loneliness among adolescents.

H3: Adolescent loneliness predicts lower levels of life satisfaction.

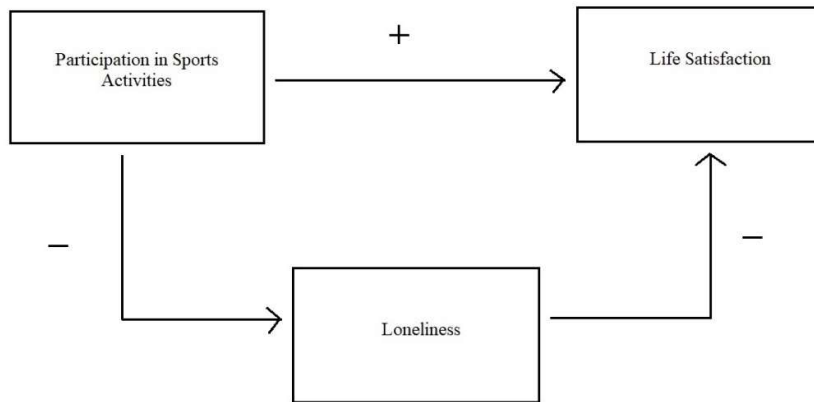
H4: Loneliness mediates the effect between participation in sports activities and life satisfaction.

Research Model

Based on previous literature and proposed hypotheses, figure 1 illustrates the predicted associations between participation in sports activities, loneliness and life satisfaction among adolescents. It is predicted that participation in sports activities will have a negative association with loneliness, loneliness will have a negative association with life satisfaction, and in turn participation in sports activities will have a positive association with life satisfaction among adolescents. Overall, the model showcases the current study's attempt to examine loneliness as a mediator for the association between participation in sports activities and life satisfaction.

Figure 1

Association between participation in sports activities, loneliness and life Satisfaction



Method

Participants

The present study was based on the data collected for the ‘YOUth Got Talent (YGT) project (Inchley et al., 2017). Data was collected in three waves between September 2019 and January 2021. The data collected for this project included three MBO schools – Grafisch Lyceum Utrecht, Nimeto Utrecht, and ROC Midden Nederland. In total, 73 classes were selected within these schools, with roughly 1,550 students in total, all at and above the age of 16. These schools covered the fields of creative, technical and health education.

For the present study, all three waves of the YGT project were used. Total participants from all three waves were 1471, however, only 219 participants were selected for the present study. These participants were selected on the basis of answering all questions that were relevant for the current study. Hence, after checking for missing data, 1252 participants were excluded from the analysis as they failed to answer questions regarding participating in sports activities, questions on the loneliness scale, and those on the life satisfaction scale. Of the remaining sample, 55.7% ($N = 123$) were girls and 41.3% ($N = 96$) were boys, with an overall mean age of 17.8 ($SD = 1.82$).

After conducting an attrition analysis, it was found that initially 81.2% of the participants had answered for the dependent variable ‘life satisfaction’ scale from the first wave, and by the third wave only 38% of the total participants answered this scale. Similarly, for the mediating variable ‘loneliness’, 59.9% participants answered this scale in the first wave but only 37.7% of the participants answered questions on loneliness in the third wave.

As life satisfaction and loneliness are personal questions that not many individuals would like to openly discuss, there is a possibility that they gradually decided not to answer these scales. Due to these drop-out rates, the final sample size of this research was only considered for those participants who answered all questions of each variable from their respective waves.

Design

The present study is longitudinal in nature with three waves of data collection, and one variable was assessed from each wave. The first variable ‘Participation in Sports Activities’, which is the independent variable, was taken from the first wave (collected between 27 September 2019 and 14 February 2020). The second variable ‘Loneliness’, which is the mediator, was taken from the second wave (collected between 7 May 2020 and 25 June 2020). The third variable ‘Life Satisfaction’, which is the dependent variable, was taken from the third wave (collected between 26 October 2020 and 8 January 2021).

Procedure

The three MBO schools were approached with the request to participate in the YOUth Got Talent project. Trained researchers visited each classroom to administer a questionnaire covering a wide range of topics. Self-report questionnaires were administered in the classroom, taking roughly 20-30 minutes. However, in wave 2 researchers engaged with the classrooms entirely online, due to the Corona crisis.

Participants gave active consent and were informed that their data would be anonymised. Ethical approval was gained from the Ethics Assessment Committee of the Faculty of Social Sciences at Utrecht University (FETC18-070) in 2018.

Measures

Participation in Sports Activities

For the independent variable, Participation in Sports Activities, data collected from Wave 1 (T1) was used. This variable was measured from a single item. To measure their participation in sports activities, they were asked ‘*Which clubs and associations are you a member of*’, if participants were part of a sports club (e.g. football, swimming, fitness or martial arts) their response was coded as 1, if they were not part of any sports club their response was coded as 0. For participants who selected other club associations such as “singing, music or drama”, or “church, mosque, other”, or there was a missing response, it was manually coded to 0.

Loneliness

For the mediating variable, Loneliness, data was collected and analyzed from Wave 2 (T2). To assess loneliness, the UCLA Loneliness Scale (Russell et al., 1980) was used. It

comprised of questions such as, ‘*I get along with others*’, ‘*I feel alone*’, or ‘*there are people I can ask for help*’. In total the UCLA Loneliness Scale has 20 items, however, for this survey only 10 items were used. The responses for each item ranged from 1 (does not fit at all) to 5 (totally correct). The Cronbach’s alpha for this variable was .88.

Life Satisfaction

The dependent variable, Life Satisfaction, was collected and analyzed from Wave 3 (T3). It was measured under the Individual Factors category. An adaptation of the Cantril Ladder (1965) scale was used for adolescents (Levin & Currie, 2014). The variable was assessed by asking the participants to answer how they feel about their life at the present moment to which they could respond with 0 (worst like I can imagine) to 10 (best life I can imagine).

Gender

For the control variable gender, data was controlled for from the first wave. Gender was measured using a simple question ‘Are you a boy or a girl?’. Response given by a male participant would be coded as 1 and by a female participant would be coded as 0.

Data Analysis

Statistical Package for Social Sciences (SPSS) was used to analyze the data for the present study. Descriptive statistics were calculated for all the variables. To evaluate the association between the variables Pearson’s *r* correlation and linear regression analysis was conducted. To test for mediation, the Baron and Kenny method was used.

Results

Before running a multiple linear regression in SPSS, all necessary assumptions were checked. These included checking for linearity, checking for the absence of multicollinearity between sports club activities and loneliness (VIF = 1.01), checking whether values of the residuals are independent via the Durbin-Watson statistic (1.91), checking for homoscedasticity through assessing the scatterplot, checking whether the values of the residuals were normally distributed by assessing the P-P plot, and lastly checking if there were no influential cases biasing the model via checking Cook’s Distance statistic for each participant. All these six assumptions were met.

Descriptive statistics, mean and standard deviation are presented in Table 1. The sample ($M_{age} = 17.8$, $SD_{age} = 1.82$), consisted of 55.7% female adolescents and 41.3% male adolescents. Among this sample, it was found that most participants do take part in sports activities ($M = 79.9\%$). Similarly, adolescents showed low levels of loneliness ($M = 1.9$, $SD =$

.65), where 1 indicated less feelings of loneliness and 5 indicated greater feelings of loneliness. Finally, it was found that these adolescents are relatively satisfied with their life ($M = 6.7$, $SD = 1.51$), where low life satisfaction would be scored 0 and high life satisfaction would be scored 10.

Table 1

Descriptive statistics mean, percentage and standard deviation of all variables

Variable	Mean (Percentage in case of dichotomous variables)	SD
Age	17.8	1.82
Males	41.3%	.49
Females	55.7%	
Participation in Sports Activities	79.9%	.40
Loneliness	1.9	.65
Life Satisfaction	6.7	1.51

Table 2 illustrates the correlation between all variables in this study. For the sample size of 219 participants, first, it was found that there is a no significant correlation between participation in sports activities and life satisfaction ($r = .09$, $p = .14$). Secondly, it was found that there is a significant but weak negative correlation between participation in sports activities and loneliness ($r = -.13$, $p = .04$). Lastly, it was found that there is a significant moderate negative association between loneliness and life satisfaction ($r = .49$, $p = <.001$.) among adolescents.

Table 2

Correlations between life satisfaction and participation in sports activities, loneliness, and life satisfaction (N = 219):

Variable	1	2	3
1. Participation in Sports Activities		-.13*	.09
2. Loneliness	-.13*		-.49**
3. Life Satisfaction	.09	-.49**	

Note. * $p < .05$, ** $p < .01$

Multiple Linear Regression

A multiple regression analysis was run to assess the associations between Participation in Sports Activities (T1) and Life Satisfaction (T3), while controlling for Gender (T1) and Life Satisfaction (T1) (See Table 3).

The first hypothesis stated that participation in sports activities predicts higher life satisfaction among adolescents. To test this hypothesis (see Table 3), a regression analysis was performed where it was found that participating in sports activities ($\beta = .07$, $p = .168$, $R^2 = .20$) was no significantly associated with life satisfaction, even after controlling for gender and life satisfaction from wave 1. Hence, hypothesis 1 was rejected.

Table 3

Effect of participation in sports activities (PSA T1) on life satisfaction, while controlling for gender (T1) and life satisfaction (T1):

	Model 1			Model 2		
	<i>b</i>	β	<i>p-value</i>	<i>b</i>	β	<i>p-value</i>
<i>Control Variables</i>						
Gender (T1)	.19	.07	.18	.16	.05	.28
Life Satisfaction (T1)	.43	.43	<.001	.43	.43	<.001
<i>Independent Variable</i>						
PSA (T1)				.26	.07	.16

Note. *b* indicates unstandardized B, β indicates standardized coefficient beta

The second hypothesis states that participation in sport activities predicts lower levels of loneliness among adolescents. When checking for this association (see Table 4), it was found that participation in sports activities ($\beta = -.01$, $p = .71$, $R^2 = .43$) does not significantly associate with loneliness, when controlling for gender and loneliness from the previous wave. Hence this hypothesis was also rejected.

Table 4

Effect of participation in sports activities (PSA T1) on loneliness (T2), while controlling for Gender (T1) and Loneliness (T1):

	Model 1			Model 2		
	<i>b</i>	β	<i>p-value</i>	<i>b</i>	β	<i>p-value</i>
<i>Control Variables</i>						
Gender (T1)	-.13	-.11	.006	-.13	-.10	.008
Loneliness (T1)	.66	.65	<.001	.66	.64	<.001
<i>Independent Variable</i>						
PSA (T1)				-.02	-.01	.717

Note. *b* indicates unstandardized B, β indicates standardized coefficient beta

The third hypothesis states that adolescent loneliness predicts lower levels of life satisfaction. In Table 5, we can see that loneliness ($\beta = -.42, p = <.001, R^2 = .28$) significantly predicts life satisfaction, and there is a negative association between the variables. This association indicates that the lonelier the participant felt, the lower their life satisfaction was predicted in the later wave. This hypothesis was supported.

The final hypothesis states that loneliness mediates the effect between participation in sports activities and life satisfaction among adolescents. As there was no significant direct effect between participation in sports activities and life satisfaction (See Figure 2), this hypothesis was rejected. According to the Baron and Kenny method, if there is no significant direct effect between the predictor variable (participation in sports activities T1) and dependent variable (life satisfaction T3), there is no mediation effect to be tested.

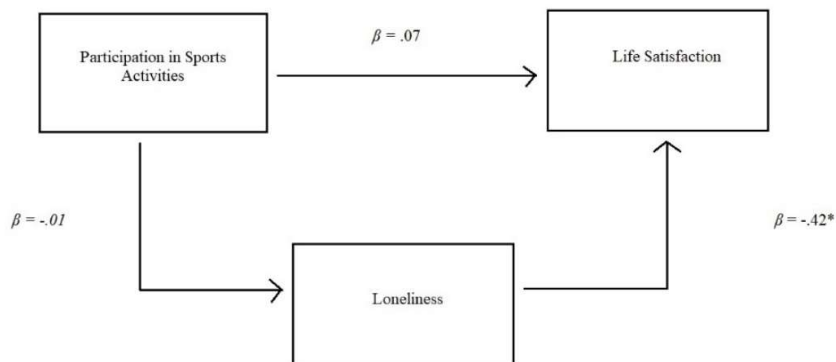
Table 5

Effects of Loneliness (T2) on Life Satisfaction (T3), while controlling for Gender (T1) and Loneliness (T1)

	Model 1			Model 2		
	<i>b</i>	β	<i>p-value</i>	<i>b</i>	β	<i>p-value</i>
<i>Control Variables</i>						
Gender (T1)	.23	.07	.12	.11	.03	.42
Loneliness (T1)	-1.07	-.43	<.001	-.35	-.14	.02
<i>Independent Variable</i>						
Loneliness (T2)				-1.05	-.42	<.001

Note. *b* indicates unstandardized B, β indicates standardized coefficient beta

Figure 2: *Regression values for the three links of the variables:*



Significance level:
* $p < .001$

Discussion

Sporting activities have a great impact on mental and physical health, healthy lifestyle habits, and teach discipline and shape one's personality. Sports is also an integral part of social life; it helps them build larger social circles alongside developing physically and improving personal skills. It helps them build character and orient themselves towards a healthy and better lifestyle (Inan & Koç, 2021). In this aspect, the present study aimed to assess the association between participation in sports activities and life satisfaction, with loneliness as a mediating variable.

When assessing for the first hypothesis, which predicted an association between participation in sports activities and life satisfaction, it was based on previous literature highlighting the beneficial effects of physical activities on life satisfaction. However, this hypothesis was rejected as no significant association was found between participating in sports activities and life satisfaction among the participants. These participants were included based on whether they were part of a sports club or not. Although literature was found regarding physical activity leading to higher life satisfaction among adolescents, it is possible that being part of a sports club is not the same as performing any physical activity, such as exercising alone or going for long walks. In a study conducted comparing athletes versus non-athletes, it was found that their overall life satisfaction was similar to one another (Ivantchev & Stoyanova, 2019). It was suggested that higher life satisfaction of these athletes was attributed to their health and overall well-being, and also for their contribution in volunteering activities that was not necessarily related to sports. Furthermore, lower neuroticism levels in these athletes also contributed to their higher life satisfaction (Ivantchev & Stoyanova, 2019). This insight does emphasis on the notion that being physically active in any form or environment can increase life satisfaction, and does not have to pertain to only group or club-based sports, such as those that were specifically assessed for the present study.

The second hypothesis that was proposed, predicted an association between participating in sports activities and loneliness. The present study focused on assessing this association by including participants who participated in sports activities that required social contact, such as those in organized team sports. The assumption that increasing social contact during their participation in sports activities and forming new relationships would reduce feelings of loneliness was rejected. There was no association found between participating in sports activities and loneliness. In team sports, maintaining a respectful and positive attitude could lead to developing strong bonds with team members and relationships in general. Violating rules, being disrespectful to other members and not actively participating makes it

difficult to form bigger and better social circles, and hence expose the consequence of experiencing feelings of loneliness (Yavuz, C. 2019). Based on the findings of previous literature, team sports help build more social connectedness and closure (Haugen et al., 2013), yet when individuals do not obey team rules or are disrespectful to their team members these feelings of such connectedness could diminish. Members that are disrespectful could also make it difficult for new team players to adjust and fit in well, leading to greater feelings of loneliness among the team members.

The third hypothesis that stated that adolescent loneliness predicts lower levels of life satisfaction, was found to be negatively correlated, and hence the hypothesis was supported. The study, based on previous literature, predicted to find benefits of social relations with higher life satisfaction among adolescents. Adolescence being a crucial stepping stone in forming and building important social relationships, was seen as a predictor of life satisfaction. Perceived social support is an important predictor of life satisfaction, where individual's subjective perception of being cared for and loved, helps them believe that they can overcome difficulties in life (Izaguirre et al., 2021), and further excel in the future.

To finally assess for the overall link between participation, loneliness and life satisfaction, the present study proposed the final hypothesis of predicting a mediating effect of loneliness between participating in sports activities and life satisfaction. However, due to no association found between participation in sports activities and life satisfaction, the mediating effect could not be tested and hence this hypothesis was rejected.

Limitations and Future Directions

The present study has several limitations that should be taken into consideration. Although the YOUth Got Talent dataset had a large sample size to conduct various studies, the inclusion criteria of the present study required only those participants to be considered who successfully answered the questions and scales of all the three focused variables. Due to this inclusion criteria, the sample size that was assessed for each association was small. Second, as the present study is based on a longitudinal research design, many varying factors that could have affected the responses of the participants over the years could not be assessed individually. Furthermore, this longitudinal study witnessed a change in the overall sample size or drop-out rates over the years. Third, with any self-report measure, responses could be subjected to social desirability or bias, especially for sensitive topics such as loneliness and life satisfaction.

It is very crucial for future research to address the impact of the COVID-19 pandemic on the life satisfaction variable that was assessed in the third wave of this study. As this study focused on the data collected on life satisfaction from the third wave (which was collected

between 26 October 2020 and 8 January 2021) the COVID-19 pandemic was still very prevalent, yet the present research did not take into consideration the effects it could have had on the overall life satisfaction of these participants. Future research could also test these results in a different population, outside the Netherlands, to assess if such findings are found to be similar or not.

Future Implications

These findings have several practical implications. First, they suggest that loneliness can have an impact on life satisfaction among adolescents, and future researchers can further delve into how to reduce feelings of loneliness and what are the main predictors of loneliness during adolescents. This way researchers can help adolescents find methods to form better and more meaningful social relationships, that help them feel supported during difficult situations and transitions in life. Secondly, as participating in sports activities can be labelled as a broad term with regard to physical activities, researchers can further investigate what kind of physical activity or what kind of frequency of such activities is required for better mental, psychical and psychological well-being among adolescents. Lastly, life satisfaction of individuals is often assessed later in life regarding finance, stability and health, yet it is still important to assess it regularly during adolescents in order to understand how resilience can already be worked upon during adolescents in order to better tackle future life problems.

Conclusion

This study assessed the association between participating in sports activities, and life satisfaction, as well as the mediating effect of loneliness on these associations. It was found that there was no association between participating in sports activities and life satisfaction, as well as participating in sports activities and loneliness. However, association between loneliness and life satisfaction was found, but loneliness could not be studied for its mediating effect between participating in sports activities and life satisfaction.

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