



**Bidirectional relationship between FoMO and life satisfaction: the role of self-esteem,  
friendship quality and gender**

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June 2023

*This thesis has been written as a study assignment under the supervision of a Utrecht University teacher. Ethical permission has been granted for this thesis project by the ethics board of the Faculty of Social and Behavioral Sciences, Utrecht University, and the thesis has been assessed by two university teachers. However, the thesis has not undergone a thorough peer-review process so conclusions and findings should be read as such.*

### **Abstract**

Previous studies have established a negative association between Fear of Missing Out (FoMO) and life satisfaction. However, it is unknown if FoMO may decrease life satisfaction or if high life satisfaction may decrease FoMO. Therefore, this longitudinal study investigated the bidirectionality of the relationship between FoMO and life satisfaction among Dutch adolescents. Furthermore, the role of self-esteem, friendship quality and gender were examined. Data from the Digital Youth Project (DiYo) collected in 2016, 2017 and 2018 was used. The sample included 787 adolescents aged between 11 and 16 years old ( $M_{age} = 13.15$ ,  $SD = 0.88$ ). As predicted, results showed that FoMO has a negative effect on adolescents' life satisfaction over time. No bidirectional relationship was found: Adolescents' higher life satisfaction did not predict lower levels of FoMO over time. Moreover, adolescents with higher levels of FoMO had less self-esteem one year later, which seem to result in lower levels of life satisfaction two years later. However, quality of friendships and gender did not impact the relationship between FoMO and life satisfaction. Practical implications are further discussed. Thus, FoMO may lead to a lower life satisfaction and self-esteem can be considered as an important factor to enhance adolescents' life satisfaction.

*Keywords:* Fear of Missing Out, life satisfaction, self-esteem, friendship quality, adolescents.

### Samenvatting

Eerdere studies vonden een negatieve relatie tussen Fear of Missing Out (FoMO) en levenstevredenheid. Het is echter niet bekend of FoMO leidt tot verminderde levenstevredenheid of hoge levenstevredenheid tot minder FoMO. Deze longitudinale studie onderzocht daarom de bidirectionele relatie tussen FoMO en levenstevredenheid onder Nederlandse adolescenten. Daarnaast is de rol van zelfvertrouwen, kwaliteit van vriendschappen en geslacht onderzocht. Data zijn verkregen via het 'Digital Youth Project (DiYo) en de data verzameld in 2016, 2017 en 2018 zijn gebruikt. De steekproef bestond uit adolescenten ( $N = 787$ ) tussen de 11 en 16 jaar oud ( $M_{\text{fit}} = 13.15$ ,  $SD = 0.88$ ). Zoals verwacht laten de resultaten zien dat FoMO een negatief effect lijkt te hebben op de latere levenstevredenheid van adolescenten. Daarnaast hadden adolescenten met meer FoMO minder zelfvertrouwen één jaar later, wat lijkt te resulteren in een lagere levenstevredenheid twee jaar later. Geen aanwijzingen zijn gevonden voor een bidirectionele relatie, want een hoge levenstevredenheid voorspelde niet minder FoMO. De kwaliteit van vriendschappen en geslacht hadden geen invloed op de relatie tussen FoMO en levenstevredenheid. Praktische implicaties zijn besproken. Concluderend, FoMO zou leiden tot een lagere levenstevredenheid en zelfvertrouwen kan beschouwd worden als een belangrijke factor om de levenstevredenheid van adolescenten te verhogen.

*Trefwoorden:* Fear of Missing Out, levenstevredenheid, zelfvertrouwen, kwaliteit van vriendschappen, adolescenten.

## Introduction

The Netherlands is the world's fifth happiest country in 2022, according to the World Happiness Report (Helliwell et al., 2022). However, the well-being of adolescents is not that impeccable. Adolescence is a crucial developmental period, and many young people experience mood changes and challenging behavior (Dahl, 2004; Vranda & Rao, 2011), which can affect adolescents' well-being and may cause stress (Goldbeck et al., 2007). Indeed, Orben et al. (2022) found a decrease in life satisfaction among adolescents and suggested that this decrease is steeper than at any other point in adulthood. Thus, the most important developmental period in life is also the period when life satisfaction comes under pressure.

Adolescents have a strong desire for belonging, connectedness with peers and social status (Barry et al., 2017; Tandon et al., 2021). A higher social status would be associated with a stronger sense of belonging (Ostrove & Long, 2007). Unmet social needs may evoke a sense of social exclusion (Tandon et al., 2021). Adolescents may experience Fear of Missing Out (FoMO), which refers to anxiety about missing pleasurable experiences enjoyed by their friends or other peers (Przybylski et al., 2013). Social media use may strengthen FoMO (Tandon et al., 2021), as it may constantly provide updates and experiences of others, which may intensify the feeling of being left behind. Adolescents' social media use has increased tremendously (Anderson & Jiang, 2018; Lenhart, 2015; Reid & Weigle, 2014) and facilitates communication and interaction with their social group (Alutaybi et al., 2020).

Since adolescents have reported a decreased life satisfaction (Orben et al., 2022; Willroth et al., 2021), it is important to understand the underlying mechanisms and risk groups. The present study addresses this gap using three annual waves of longitudinal data among Dutch adolescents, the Digital Youth (DiYo) project. The main aim of this study is to better understand the directionality of the relationship between FoMO and life satisfaction among adolescents, and to gain more insight into possible underlying mechanisms, as well as possible risk groups (see Figure 1).

### **FoMO and life satisfaction**

The relationship between FoMO and life satisfaction can be explained by the Self-Determination Theory (SDT: Deci & Ryan, 2000), which suggests that three psychological needs have to be met to increase life satisfaction: Autonomy, competence and relatedness (Tang et al., 2021). The need for relatedness includes a sense of belonging and connection to others. FoMO may be explained by this unmet need and can be experienced as

social exclusion (Przybylski et al., 2013; Roberts & David, 2020). Thus, when the need for relatedness is not (fully) met, it may result in reduced well-being.

Indeed, research shows that FoMO may be associated with decreased life satisfaction, as shown by cross-sectional research among (first year) college students (Milyavskaya et al. 2018; Roberts & David, 2020) as well as among (young) adults (Giagkou et al., 2018; Przybylski et al., 2013; Stead & Bibby, 2017). Cross-sectional research specifically about online FoMO among adults also indicated this negative relationship (Bakioğlu et al., 2022).

Although cross-sectional research shows a negative relationship between FoMO and life satisfaction, they do not provide information on the direction of this relationship. Theoretically, one could also expect a reversed relationship between FoMO and life satisfaction. Adolescents who are satisfied with their lives may be less likely to experience FoMO, as they may focus relatively more on what they have and pay less attention to what others are doing. On the other hand, adolescents who are dissatisfied with their lives may be more likely to experience FoMO, because they may feel they are missing out on opportunities that could improve their overall life satisfaction. To our knowledge, no longitudinal research exists about the influence of life satisfaction on FoMO, whereas longitudinal research by Schmuck (2021) found that FoMO would reduce adolescents' social well-being over time. In sum, according to the Self-Determination Theory and results from previous research, a bidirectional relationship between FoMO and adolescents' life satisfaction is expected.

H1: The relationship between FoMO and adolescents' life satisfaction will be bidirectional.

### **Self-esteem**

Based on the Social Comparison Theory, which refers to the tendency of using other people as sources of information to evaluate themselves (Verduyn et al., 2020), the relationship between FoMO and life satisfaction can possibly be explained by the role of self-esteem. FoMO may lead to upward social comparison, where adolescents compare themselves to others who are perceived as better off (Gomez et al., 2022). These social comparison processes may be facilitated by social media, as they may provide a constant stream of information and updates of their peers, showcasing their seemingly fulfilling experiences (Vogel et al., 2015). These comparisons with others may lead to the feeling of being left out or may contribute to feelings of inferiority, and may therefore negatively affect their self-esteem (Moksnes & Espnes, 2013; Vogel et al., 2014). Indeed, cross-sectional research shows that high FoMO is often linked to low self-esteem among adults (Uram & Skalski, 2022) and young adults (Barry & Wong, 2020; Przybylski et al., 2013).

Lowered self-esteem can be related to decreased confidence, decreased sense of adequacy and the feeling that one has no purpose in the world (Moksnes & Espnes, 2013). Cross-sectional research also indicated a negative relationship between self-esteem and life satisfaction among adults (Giagkou et al., 2018; Uram & Skalski, 2022) and that upward social comparison created life dissatisfaction (Muller & Fayant, 2010). In sum, due to upward social comparison processes, the negative relationship between FoMO and life satisfaction can be expected to (partly) result from lowered self-esteem.

H2: The effect of FoMO on adolescents' life satisfaction will (partly) result from lowered self-esteem.

### **Quality of friendships**

The relationship between FoMO and life satisfaction may be stronger for some than for others. The perceived quality of friendships may play a role in the strength of this relationship. On basis of the Self-Determination Theory, it can be suggested that the unmet need for relatedness may strengthen the negative effects of FoMO. Adolescents who are unfulfilled in this need, may experience absence of high-quality friendships, and therefore may have limited social support and a lack of meaningful connections (Deci & Ryan, 2000). Those adolescents may feel disconnected and can be worried about their position in the group, which may intensify the negative emotions associated with FoMO, which negatively affect their life satisfaction (Jood, 2017). Thus, the negative effects of FoMO on life satisfaction may be stronger among adolescents who experience low-quality friendships.

High-quality friendships, on the other hand, can be expected to provide emotional support and a feeling of understanding, which may create a strong sense of relatedness. This may lead to the feeling of having a deeper connection that may play down the negative feelings of social exclusion due to a missed social activity. Thus, the negative effects of FoMO on life satisfaction may be weaker among adolescents who experience high-quality friendships.

Indeed, cross-sectional research indicated that good friendship is a significant source of support (Zimet et al., 1988) and can be considered as a protective factor to increase the happiness of adolescents (Demir & Özdemir, 2010). Support of friends also buffers the relation between negative life events and mental health (Folger & Wright, 2013). When experiencing high-quality friendships, it can be expected that FoMO may affect life satisfaction to a lesser extent.

H3: FoMO will affect adolescents' life satisfaction to a lesser extent among adolescents who experience high-quality friendships, in comparison to adolescents who experience low-quality friendships.

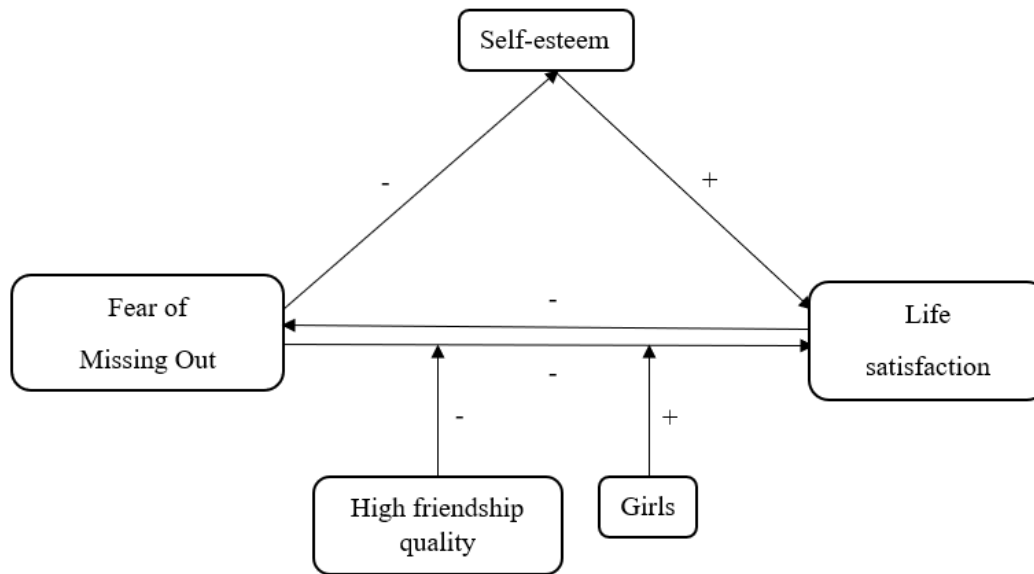
### **Gender differences**

Research addressing gender differences in FoMO shows contrasting results. Cross-sectional research found higher levels of FoMO in boys compared to girls (Gul et al., 2022), others stated the opposite (Beyens et al., 2016; Elhai et al., 2018) and some indicated no gender differences (Coskun & Karayagız Muslu, 2019; Perrone, 2016; Servidio, 2021). Whether girls or boys experience more FoMO is not clear, but research on gender differences in emotion regulation is extensive. This research suggests that girls and boys differ in experiencing and regulating negative emotions. Girls seem to have more frequent and more intensive negative emotions (Frost et al., 2015) and may experience more difficulty regulating their negative emotions than boys (Bender et al., 2012). Negative feelings of FoMO may therefore have more impact on girls than boys.

Moreover, cognitive reappraisal can be a useful tool to manage the negative emotions associated with FoMO. Cognitive reappraisal is an emotion regulation strategy to decrease negative feelings and increase well-being, by reframing an event to change one's response to this emotional or stressful event (Esmailinasab et al., 2016; Hartanto et al., 2022; Kwon et al., 2013). Adolescents could reappraise the missed opportunity to meet friends as not that enjoyable or not as important, instead of feeling bothered (Hartanto et al., 2022). Boys are able to implement cognitive reappraisal with less effort than girls (McRae et al., 2008), so the negative effects of FoMO may have more impact on girls than boys.

Furthermore, girls tend to place more emphasis on (deep) communication in their friendships than boys (Gorrese & Ruggieri, 2012). This increased communication may provide information about events that one may not be able to attend. Besides that, girls may be more likely to initiate and maintain friendships than boys (Vaquera & Kao, 2008), which can increase the frequency of FoMO. Concluding, due to differences in emotion regulation and the importance attached to interpersonal communication within friendships, girls will generally experience more from FoMO than boys.

H4: FoMO will affect life satisfaction to a greater extent among girls, in comparison to boys.

**Figure 1***Research model***Method****Design**

The data for this study were obtained from the Digital Youth project (DiYo): a longitudinal study about online behavior and mental health problems among Dutch secondary school students. Students were recruited through schools in urban and suburban areas in the Netherlands. The data were collected through an online Dutch self-report questionnaire using Qualtrics survey software during school hours and contains five waves from 2015 to 2019. In the present study, data from the first wave were excluded, as FoMO at T1 was measured differently than in the follow-up waves. Data from the second (2016), third (2017) and fourth (2018) measurement waves were included and are further referred to as T1, T2 and T3 respectively.

**Sample**

A total of 2100 adolescents were included at T1, of which 1750 also participated at T2 (drop-out of 16.7% of T1) and 919 also participated at T3 (drop-out of 56.2% of T1). The nonresponse was mainly due to class withdrawal or difficulty with scheduling time to participate. Due to 132 participants with missing values, the final sample consists of 787 participants eligible for analyses. A total of 430 participants were male (54.6%) and the age ranged from 11 to 16 years ( $M_{age} = 13.15$ ,  $SD = 0.88$ ) at T1. Students were in vocational education (24.1%), vocational education/highschool (18.7%), highschool (8.8%),



highschool/pre-university (40.8%) or pre-university (7.6%). Most students (96.4%) had a Dutch background.

An attrition analysis was conducted using an independent sample-t-test. The average level of FoMO, life satisfaction, self-esteem and quality of friendship were compared between those who dropped out and those who participated in all three waves. Participants who dropped out of the study did not significantly differ from those who participated in all three waves on FoMO ( $t(1904) = -1.286, p = .198$ , two-tailed). The two groups did not significantly differ on the average level of life satisfaction ( $t(1893) = -0.996, p = .319$ , two-tailed) and the average level of self-esteem ( $t(1889) = -0.359, p = .720$ , two-tailed). Lastly, the two groups did score significantly differently on the level of quality of friendship ( $t(1901) = -2.723, p = .007$ , two-tailed). The sample in this study has slightly higher levels of quality of friendships. Thus, this suggests that those who dropped out and those who completed all three waves have similar levels of FoMO, life satisfaction and self-esteem at T1.

### **Procedure**

Prior to the study, parents were informed about the content of the study and were able to refuse their child's participation by withholding informed consent. Participants were informed about the subject and purpose of the study, that participation was voluntary and anonymous, and that they could withdraw from the questionnaire at any moment. The assessments were carried out in accordance with the Declaration of Helsinki and the study was approved by the ethical board of the Faculty of Social Sciences at Utrecht University (FETC16-076 Eijnden).

### **Measurements**

#### ***Life satisfaction***

*Life satisfaction* was measured using the seven-item Student's Life Satisfaction Scale (Huebner, 1991). Respondents were asked about their perceptions of their own life, for example, whether they are satisfied with their current life (1 *strongly disagree* to 6 *strongly agree*). Two items of the original scale were recoded reversely, so that a higher score indicated a higher life satisfaction. Scores on the seven items were averaged. Cronbach's  $\alpha$  was .84 at both T1 and T3.

#### ***Fear of Missing Out***

*FoMO* was measured using five items of the Fear of Missing Out scale (Przybylski et al., 2013). Respondents had to report their feelings in relation to others, for example, whether they are worried when their friends are having fun without them (1 *not correct at all* to 5

*totally correct*). Scores on the five items were averaged, with a higher score indicating more FoMO. Cronbach's  $\alpha$  was .83 at both T1 and T3.

### ***Self-esteem***

*Self-esteem* was measured using the five-item Rosenberg Self-esteem Scale (Rosenberg, 1965). Respondents were asked about their thoughts about themselves, for example, whether they think positively about themselves (1 *strongly disagree* to 5 *strongly agree*). One item of the original scale was recoded reversely, so that a higher score indicated more self-esteem. Scores on the five items were averaged. Cronbach's  $\alpha$  was .81 at T2.

### ***Quality of friendships***

*Quality of friendships* was measured using the five-item "close friendship"-subscale of the Self-Perception Profile for Adolescents (Harter, 2012; Straathof & Treffers, 1989). Respondents were asked about their friendships, for example, whether they find it difficult to make friends one can count on (1 *not correct at all* to 5 *totally correct*). Four items of the original scale were recoded reversely, so that a higher score indicated a higher quality of friendship. Scores on the five items were averaged. Cronbach's  $\alpha$  was .65 at T1.

### ***Gender***

*Gender* was measured by one question: "Are you a boy or a girl?" (1 *boy* and 2 *girl*).

### **Data-analysis**

In this study, FoMO was the predictor and life satisfaction was the outcome variable. Self-esteem is considered as a mediator and quality of friendships and gender as moderators. A filter was made, so only participants who completed the questionnaire at T1, T2 and T3 were included. The scales were recoded, so that all the items have the same direction. An independent sample t-test was conducted, to test if participants who dropped out differed from the sample. Factor- and reliability analyses were conducted.

Furthermore, descriptive statistics, such as gender, age, education level and ethnicity were requested. After that, the mean scores at T1, T2 and T3 for the variables FoMO, life satisfaction, self-esteem and quality of friendships were calculated. A paired sample t-test indicated if the increase or decrease over time was significant. The correlations between the demographic, main, mediation and moderation variables were also requested. Gender, age, education level and ethnicity served as control variables in the regressions, as they may be confounders.

Besides that, the bidirectional relationship between FoMO and life satisfaction was analysed by using hierarchical linear regression analyses. The Baron and Kenny method (1986) was used to test the hypothesis for mediation. The first step of this method was testing

the effect of the independent variable on the dependent variable (path c). After that, it was tested whether the independent variable has a significant effect on the mediator (path a) and if the mediator has a significant effect on the dependent variable (path b). The independent variable and the mediator were put in the same model to test the effect of the independent variable, while controlling for the mediator (path c'). Mediation occurs when the independent variable has no longer a significant effect on the dependent variable. Sobels' test was used to determine the significance of the mediator (Sobel, 1982). Lastly, the moderating effect of gender and quality of friendships was tested by adding the interaction terms between the independent variable and gender or quality of friendships to the regression models. Therefore, the independent variable FoMO and the mediator quality of friendships were centered. All analyses were performed using IBM SPSS Statistics Version 28.

## Results

### Descriptive statistics

The sample consisted of 787 participants who completed the questionnaire in all three waves. Table 1 presented the descriptive statistics of the sample at T1 and Table 2 displayed the mean differences over time. These scores indicated that FoMO significantly increased between T1 and T3 ( $t(693) = -3.749, p = < .001$ , two-tailed). At the same time there was a minimal decrease in mean score for life satisfaction. This decrease in mean score was also significant ( $t(688) = 7.924 = p < .001$ , two-tailed).

**Table 1**

*Characteristics of the sample (N=787) at T1*

	<i>M (SD)</i>
Age (range: 11-16)	13.15 (0.88)
	<i>N (%)</i>
Gender	
Male	430 (54.6)
Female	357 (45.4)
Education level	
Vocational education	190 (24.1)
Vocational education/Highschool	147 (18.7)
Highschool	69 (8.8)
Highschool/Pre-university	321 (40.8)
Pre-university	60 (7.6)
Ethnicity	
Dutch	759 (96.4)
Non-Dutch	28 (3.6)

**Table 2***Mean scores for FoMO, life satisfaction, quality of friendships, gender and self-esteem*

	<i>N</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum
FoMO T1	781	1.74	0.70	1.00	5.00
FoMO T2	837	1.80	0.73	1.00	5.00
FoMO T3	804	1.86	0.77	1.00	5.00
Life satisfaction T1	778	4.78	0.83	1.00	6.00
Life satisfaction T2	836	4.58	0.87	1.00	6.00
Life satisfaction T3	800	4.47	0.89	1.00	6.00
Quality of friendships T1	780	4.38	0.67	1.00	5.00
Quality of friendships T2	837	4.33	0.69	1.00	5.00
Quality of friendships T3	804	4.43	0.68	1.00	5.00
Self-esteem T1	777	3.89	0.75	1.00	5.00
Self-esteem T2	832	3.77	0.73	1.00	5.00
Self-esteem T3	799	3.74	0.74	1.00	5.00

**Correlations**

Table 3 reported the correlations between the different variables. The results showed a strong negative correlation between FoMO and life satisfaction, cross-sectionally and longitudinally. Furthermore, self-esteem was negatively correlated with FoMO at T1 and positively correlated with life satisfaction at T3. Moreover, quality of friendships was negatively correlated with FoMO at both measurements and positively correlated with life satisfaction at both measurements. Gender was positively correlated with FoMO at both measurements and negatively correlated with life satisfaction at T3. No significant correlation between gender and life satisfaction at T1 had been found.

Lastly, results from Table 3 indicated that the significance of the correlations between the demographic variables and the main variables differed between measurements. Age was only significantly correlated with life satisfaction at T1. Education level was significantly correlated with FoMO at both measurements, while only a significant correlation between education level and life satisfaction at T1 had been found. Ethnicity had only a significant correlation with life satisfaction at T3. Thus, in the multivariate analyses, age, gender, education level and ethnicity were included as control variables.

**Table 3**

*Correlations between the demographic variables, FoMO, life satisfaction, quality of friendship, gender and self-esteem*

	1	2	3	4	5	6	7	8	9	10
Demographic variables										
1. Age	-									
2. Education level	.095**	-								
3. Ethnicity <sup>a</sup>	.077*	.015	-							
Main variables										
4. FoMO T1	.002	.094**	.012	-						
5. FoMO T3	.039	.106**	.022	.411**	-					
6. Life satisfaction T1	-.109**	-.081*	-.039	-.399**	-.209**	-				
7. Life satisfaction T3	.019	-.002	-.085*	-.255**	-.316**	.461**	-			
Moderators										
8. Quality of friendships T1	-.031	.121**	.013	-.245**	-.123**	.293**	.208**	-		
9. Gender T1 <sup>b</sup>	-.056	.139**	.018	.138**	.176**	-.054	-.116**	.195**	-	
Mediator										
10. Self-esteem T2	-.016	.020	.009	-.305**	-.185**	.377**	.338**	.152**	.189**	-

*Note.* For education level, ethnicity and gender Spearman's rho was used. Pearson's correlation coefficient was used for all other correlations.

<sup>a</sup>Reference category = Dutch. <sup>b</sup>Reference category = boys.

\* $p < 0.05$ . \*\* $p < 0.01$

### Effect of FoMO on life satisfaction

Hierarchical linear regression analysis was used to examine if FoMO predicted life satisfaction over time (hypothesis 1). Table 4 shows there was a small, significant negative effect of FoMO at T1 on life satisfaction at T3, even after controlling for gender, age, education level, ethnicity and life satisfaction at T1. The proportion of explained variance in life satisfaction at T3 by FoMO at T1 was .005.

**Table 4**

*Linear regression analysis of FoMO at T1 and life satisfaction at T3 (N = 787)*

<i>Predictor</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>p</i>	$\Delta R^2$
Step 1					.225***
Gender <sup>a</sup>	-.106	.061	-.059	.086	
Age	.069	.035	.068	.048*	
Education level	.024	.022	.036	.288	
Ethnicity <sup>b</sup>	.277	.163	.057	.091	
Life satisfaction T1	.500	.036	.467	<.001***	
Step 2					.005*
FoMO T1	-.097	.047	-.076	.040*	

*Note.* <sup>a</sup>Reference category = boys. <sup>b</sup>Reference category = Dutch.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

### Effect of life satisfaction on FoMO

Subsequently, it was tested if life satisfaction predicted FoMO over time (hypothesis 1). In Step 1, gender, age, education level, ethnicity and FoMO at T1 were added. Table 5 shows that after controlling for these variables, the effect of life satisfaction at T1 on FoMO at T3 was not significant. Life satisfaction at T1 had no effect on FoMO at T3. Thus, the first hypothesis that the relationship between FoMO and life satisfaction would be bidirectional was only partly confirmed.

**Table 5***Linear regression analysis of life satisfaction at T1 and FoMO at T3 (N = 787)*

<i>Predictor</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>p</i>	$\Delta R^2$
Step 1					.180***
Gender <sup>a</sup>	.127	.055	.082	.021*	
Age	.034	.031	.039	.264	
Education level	.026	.020	.046	.194	
Ethnicity <sup>b</sup>	.014	.144	.003	.924	
FoMO T1	.434	.038	.397	<.001***	
Step 2					.002
Life satisfaction T1	-.044	.035	-.048	.210	

*Note.* <sup>a</sup>Reference category = boys. <sup>b</sup>Reference category = Dutch.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

### **Mediator self-esteem**

The first condition of the Baron and Kenny method (1986) was met: the independent variable had a significant effect on the dependent variable. Therefore, it was possible to test for a mediating effect in the relation between FoMO and life satisfaction. The mediating role of self-esteem was examined (hypothesis 2). Table 6 shows that FoMO at T1 had a negative significant association with self-esteem at T2, which in turn had a positive significant effect on life satisfaction at T3. Thus, the second and third conditions were also met.

The complete model, including the mediator and independent variable, showed that FoMO at T1 had no longer a significant effect on life satisfaction at T3, when self-esteem at T2 is added as a predictor. The effect of self-esteem at T2 on life satisfaction at T3 was significant when controlling for FoMO at T1. Thus, the relationship between FoMO and life satisfaction appeared to be completely mediated by self-esteem, and therefore supported hypothesis 2. Sobels' test was conducted which indeed showed that the mediation of self-esteem was significant ( $z = -4.27$ ,  $p < .001$ ). Self-esteem explained .028 of the variance of life satisfaction at T3.

**Table 6**

*Linear regression analysis of mediator self-esteem at T2 between FoMO at T1 and life satisfaction at T3*

<i>Predictor</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>p</i>	$\Delta R^2$
<b>Outcome self-esteem T2 (N = 787)</b>					
Step 1					.031***
Gender <sup>a</sup>	-.255	.055	-.175	<.001***	
Age	-.027	.031	-.033	.389	
Education level	.022	.020	.042	.269	
Ethnicity <sup>b</sup>	-.073	.147	-.018	.622	
Step 2					.083***
FoMO T1	-.300	.037	-.291	<.001***	
<b>Outcome life satisfaction T3 (N = 787)</b>					
Step 1					.225***
Gender <sup>a</sup>	-.106	.061	-.059	.086	
Age	.069	.035	.068	.048*	
Education level	.024	.022	.036	.288	
Ethnicity <sup>b</sup>	.277	.163	.057	.091	
Life satisfaction T1	.500	.036	.467	<.001***	
Step 2					.028***
Self-esteem T2	.226	.045	.184	<.001***	
<b>Outcome life satisfaction T3 (N = 787)</b>					
Step 1					.225***
Gender <sup>a</sup>	-.106	.061	-.059	.086	
Age	.069	.035	.068	.048*	
Education level	.024	.022	.036	.288	
Ethnicity <sup>b</sup>	.277	.163	.057	.091	
Life satisfaction T1	.500	.036	.467	<.001***	
Step 2					.030***
FoMO T1	-.059	.047	-.046	.210	
Self-esteem T2	.217	.045	.176	<.001***	

*Note.* <sup>a</sup>Reference category = boys. <sup>b</sup>Reference category = Dutch.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .



### Moderator quality of friendships

It was tested whether quality of friendships was a moderator in the relationship between FoMO at T1 and life satisfaction at T3 (hypothesis 3). First, the variables FoMO and quality of friendships were centered. The interaction term of quality of friendships at T1 and FoMO at T1, as well as quality of friendship at T1 were added to the regression model in Step 3 in Table 7. However, the interaction term was non-significant. Thus, the effect of FoMO on life satisfaction did not differ between adolescents who experienced high-quality friendships and adolescents who experienced low-quality friendships. Therefore, hypothesis 3 was not supported. However, the quality of friendships at T1 did have a significant positive effect on life satisfaction at T3. Adolescents who experienced high-quality friendships did report higher levels of life satisfaction later.

**Table 7**

*Linear regression analysis of FoMO at T1, life satisfaction at T3 and moderator friendship quality at T1 (N = 787)*

<i>Predictor</i>	<i>B</i>	<i>SE</i>	<i>β</i>	<i>p</i>	<i>Δ R<sup>2</sup></i>
Step 1					.225***
Gender <sup>a</sup>	-.106	.061	-.059	.086	
Age	.069	.035	.068	.048*	
Education level	.024	.022	.036	.288	
Ethnicity <sup>b</sup>	.277	.163	.057	.091	
Life satisfaction T1	.500	.036	.467	<.001***	
Step 2					.005*
FoMO T1	-.097	.047	-.076	.040*	
Step 3					.006
Quality of friendship T1	.111	.050	.083	.028*	
FoMO T1 *	-.011	.053	-.007	.839	
Quality of friendship T1					

*Note.* <sup>a</sup>Reference category = boys. <sup>b</sup>Reference category = Dutch.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

### Moderator gender

It was tested whether gender was a moderator in the relationship between FoMO at T1 and life satisfaction at T3 (hypothesis 4). The interaction term of gender at T1 and FoMO at T1 was added to the regression model in Step 3 in Table 8. However, this was

non-significant. Thus, the effect of FoMO on life satisfaction did not differ between boys and girls, and therefore hypothesis 4 was not supported.

**Table 8**

*Linear regression analysis of FoMO at T1, life satisfaction at T3 and moderator gender at T1 (N = 787)*

<i>Predictor</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>p</i>	$\Delta R^2$
Step 1					.225***
Gender <sup>a</sup>	-.106	.061	-.059	.086	
Age	.069	.035	.068	.048*	
Education level	.024	.022	.036	.288	
Ethnicity <sup>b</sup>	.277	.163	.057	.091	
Life satisfaction T1	.500	.036	.467	<.001***	
Step 2					.005*
FoMO T1	-.097	.047	-.076	.040*	
Step 3					
FoMO T1 *	.130	.086	.161	.132	.003
Gender T1					

*Note.* <sup>a</sup>Reference category = boys. <sup>b</sup>Reference category = Dutch.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

## Discussion

The study aimed to understand the relationship between FoMO and adolescents' life satisfaction and tested whether this relationship was affected by perceived quality of friendships and gender. Moreover, it was tested whether the effect of FoMO on adolescents' life satisfaction resulted from lowered self-esteem. The results suggest that FoMO predicts a decrease in life satisfaction two years later. Moreover, the findings indicate that self-esteem appeared to play an important role in explaining the effect of FoMO on life satisfaction: Adolescents with higher levels of FoMO had less self-esteem one year later, which, in turn, seem to result in lower levels of life satisfaction two years later. No evidence was found for the opposite directionality: life satisfaction did not predict a decrease in FoMO two years later.

Partly in line with hypothesis 1, the findings suggest that experiencing high levels of FoMO negatively affects later life satisfaction. More specifically, adolescents with higher levels of FoMO report lower levels of life satisfaction two years later. This result was found after adjusting for gender, age, education level, ethnicity and previous levels of life

satisfaction. This is in line with a longitudinal study that identified FoMO as a predictor of life satisfaction on a later occasion (Schmuck, 2021). According to the Self-Determination Theory, FoMO can be explained by the unmet need for relatedness, which may result in reduced well-being. On the contrary, no evidence was found to suggest that life satisfaction prevents feelings of FoMO over time. Adolescents with higher levels of life satisfaction did not report lower levels of FoMO two years later. This result is not in line with the theoretical perspective that adolescents who are satisfied with their lives may be less likely to experience FoMO, because they may focus relatively more on what they have and will pay less attention to what others are doing. Another explanation for the absence of this effect may be that two years is a long period in the lives of adolescents and that possible (short-term) effects may already have faded away. Thus, hypothesis 1 about the bidirectional relationship between FoMO and adolescents' life satisfaction is only partly supported.

The results of this study also suggested that the effect of FoMO on life satisfaction was completely mediated by self-esteem. Adolescents with higher levels of FoMO had less self-esteem one year later, which, in turn, seem to result in lower levels of life satisfaction two years later. This is in line with several studies that reported an association between FoMO and self-esteem on the one hand (Barry & Wong, 2020; Przybylski et al., 2013) and between self-esteem and life satisfaction on the other hand (Giagkou et al., 2018; Uram & Skalski, 2022). One mechanism that may explain how FoMO may decrease self-esteem is upward social comparison. When experiencing FoMO, adolescents can compare themselves to others who are perceived as better off (Gomez et al., 2022). These social comparison processes may be facilitated by social media, due to the constant stream of information and updates of their peers. These comparisons with others may lead to the feeling of being left out, which may lead to a lowered self-esteem (Moksnes & Espnes, 2013; Vogel et al., 2014). Lowered self-esteem can be related to decreased confidence, decreased sense of adequacy and the feeling that one has no purpose in the world (Moksnes & Espnes, 2013). Thus, the results did support hypothesis 2 implying that the effect of FoMO on adolescents' life satisfaction would (partly) result from lowered self-esteem.

Hypothesis 3 suggesting that the effect of FoMO on life satisfaction would be stronger for adolescents who experience high-quality friendships was not supported by the present data. This may imply that even adolescents with high-quality friendships still experience a significant influence of FoMO on their life satisfaction. These results are not in line with existing studies which suggest that support from friends would buffer the relation between negative life events, for example experiencing FoMO, and mental health (Folger &

Wright, 2013). One possible explanation may be that the intensity of experiencing FoMO may overpower the potential buffering effects of high-quality friendships. Besides that, a positive longitudinal relationship between quality of friendships and life satisfaction was found, which may suggest that FoMO and quality of friendships are two independent predictors of life satisfaction. Thus, the results did not support hypothesis 3 that FoMO would affect adolescents' life satisfaction to a lesser extent among adolescents who experience high-quality friendships, in comparison to adolescents who experience low-quality friendships. Further studies could research if the quantity of spending time with friends may affect the relationship between FoMO and life satisfaction.

Finally, different from what was expected in hypothesis 4, the findings show that the effect of FoMO on life satisfaction did not differ between boys and girls. These results are not in line with existing studies which suggest that negative feelings of FoMO may have more impact on girls than boys, due to gender differences in experiencing and regulating negative emotions, cognitive reappraisal and the emphasis on (deep) communication (Beyens et al., 2016; Elhai et al., 2018). One possible explanation for this discrepancy may be that individual differences within gender groups, factors such as personality traits or coping strategies, might have overshadowed the potential moderating effect of gender. Thus, the present results suggest that FoMO will affect life satisfaction both among girls and boys.

The current study has its strengths and limitations. The foremost strength of this study is the use of three-wave longitudinal data, whereas previous studies have mostly used cross-sectional designs. This makes it possible to analyse relationships over time and gain insight into the directionality of the relationship. Another strength of this study is the focus only on adolescents, while other studies mostly focus on university students or adults. Additionally, the data considered a large school-sample, which makes the results more generalisable to the general population of adolescents. Lastly, this study is one of the first to study FoMO in relation to life satisfaction among Dutch adolescents.

Besides these strengths, there are several limitations that should be mentioned. The attrition analyses showed that those who dropped out and those who completed all three waves did significantly differ in their quality of friendships: Those who dropped-out reported slightly a lower quality of friendships. Moreover, due to the relative higher drop-out of students in vocational education levels, the findings are less generalisable to adolescents with these vocational educational backgrounds. In addition, although the scale measuring quality of friendships has been validated, the scale provided a relatively low reliability. In the future, more attention should be paid to data collection among these students to minimise the

drop-out and it should be organised in multiple ways to include all educational levels.

This study adds to the growing body of literature on FoMO and provides empirical support for the idea that FoMO would negatively impact adolescents' life satisfaction. Additionally, it emphasises the important role self-esteem may play in the relation between FoMO and adolescents' life satisfaction. The current study provides some practical implications and input for further research. Educational institutions can play a role in developing media literacy of adolescents by offering workshops that teach adolescents to critically evaluate information of social media content and recognize the potential idealised representations of other's lives. Additionally, coping skills training programs can be implemented to equip adolescents with practical tools to manage their FoMO related distress, such as adaptive cognitive reappraisal or mindfulness techniques. Moreover, schools should be made aware of the positive role that self-esteem can play in the prevention of mental health problems and may implement this component in mentor classes. Future research should further examine the negative implications of FoMO on adolescents' (physical) wellbeing, as well as the positive role of self-esteem that may enhance life satisfaction and the possible positive contribution of the quantity of time spent with friends. The significant results found in this study suggest that experiencing FoMO leads to a lower life satisfaction and that self-esteem may be considered as an important factor to enhance the life satisfaction of adolescents in that crucial developmental period.

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## Appendices

### Appendix 1: Registration Form: Research Activities for TED-students (in total 60 hours)

Research activities	Total number of hours	Signature YS staff
Training session + preparation	10 hours	
Week 52: 3 articles	3,25 hours	
Week 2: correct codings from week 52 + 5 articles	3,75 hours	
Week 5: 20 articles	8,25 hours	
Week 6: 22 articles	8,5 hours	
Week 7: 39 articles	14,25 hours	
Week 8: 5 articles	2 hours	
Week 9: 14 articles	5 hours	
Week 10: 2 articles	1 hour	
Week 11: 12 articles	4 hours	
<b>TOTAL</b>	<b>60 hours</b>	

## **Appendix 2: Interdisciplinarity of this study**

The different contexts that Sameroff (2009) identifies as important for explaining psychological or sociological phenomena are agents in the school, family and cultural contexts. Peer influences play also an important role, which are not part of Sameroff's model.

Research has suggested that adolescents' life satisfaction can come under pressure in this developmental period. Life satisfaction is perceived by the self and therefore a psychological concept. The use of theoretical insights are therefore mainly based on psychological disciplines. However, life satisfaction can also be explained from several scientific disciplines, such as social discipline. So, concepts from different disciplines may be needed.

The focus is on psychological disciplines to explain life satisfaction. Both the Self-Determination Theory as well as upward social comparison processes are based on a psychological discipline. The Self-Determination Theory suggests that a sense of relatedness leads to an increased well-being. This sense of relatedness is important for adolescents to value their life satisfaction. Besides that, high self-esteem can lead to an increased life satisfaction. Self-esteem can be influenced through upward social comparison processes. In sum, it is useful to use these theoretical insights in particular.

The variables in the model are from different spheres. The variables in this study are Fear of Missing Out, life satisfaction, self-esteem, quality of friendships and gender. These variables can all be classified into a personal context. Fear of Missing Out and the quality of friendship can also fall under social context (e.g., school, neighborhood, social media). One factor of FoMO is the social pressure to belong. One may feel the pressure to maintain a certain level of popularity and maintain it over time. At school or when on social media, adolescents may experience FoMO the most. Adolescents have a need for relatedness and they spend a lot of time at school. Friendships are therefore mainly made at school. Social media has also come to play an important role in their lives. The variable life satisfaction is influenced by the variable self-esteem, which in turn is affected by the variable FoMO. Gender and high-quality friendships interact on the relation between FoMO and life satisfaction.

The model can to a certain extent be evaluated as interdisciplinary. On the one hand, the theoretical insights are only from a psychological discipline. On the other hand, the variables are from a personal as well as a broader social context.

### Appendix 3: Contract data-use TED track

Utrecht, 2022

This letter constitutes formal confirmation of the fact that the data from the Utrecht University Digital Youth Project (2019) have been made available to Tessa van Koppen of Utrecht University. These data will not be made available to others, and the data may be used only for analysis and reporting on topics for the thesis, about which agreement has been reached with Regina van den Eijnden. Tessa van Koppen will receive access to the data from the dataset in order to answer the following research questions within the framework of the thesis:

Research question: Is there a bidirectional relationship between FoMO and adolescents' life satisfaction and what is the role of self-esteem, quality of friendships and gender?

The following variables will be used: Dependent variable: life satisfaction (Q38). Independent variables: Fear of Missing Out (Q36). Other variables: Self-esteem (Q39), Quality of friendships (Q78) and Gender (Q3). No report based on the data from the project entitled Digital Youth Project will be made public, unless permission has been obtained in advance from the Project Coordinator for the Digital Youth Project. After the expiration of this contract, dated 30 June 2023, Tessa van Koppen shall delete the Digital Youth Project data.

Dates and signature:

27 January 2023

A handwritten signature in black ink, appearing to be 'Tessa van Koppen', written over a horizontal line.

Name of student:

Tessa van Koppen

Name of Project Coordinator:

Regina van den Eijnden