

**Mental Health in Dutch Adolescents and the Role of Parental Communication:
A Gendered Perspective**

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Abstract

Background. Various studies have found that there is a relationship between parental-adolescent communication and the mental health of adolescents, and that gender differences do exist. This study aimed to investigate this relationship along with gender differences, by examining the relationships that exist between parents and adolescents, respectively.

Methods. The data used in this study is from the Dutch nationally representative HBSC study (N=7588), where a self-reported questionnaire was used as a mechanism to collect data.

Multiple regression analyses were run to test the association between parent-adolescent communication and the mental health of adolescents. **Results.** Results found a significant relationship between communication and mental health. Differences were found among the gender of the parent and adolescent, with the association between communication having a stronger effect on girls overall and communication with fathers were found to have a surprisingly stronger association with mental health. **Conclusion.** This study found a significant relationship between parent-adolescent communication and the mental health of Dutch adolescents. Overall, girls and fathers played a big role in this study as they were found to have stronger associations with communication and mental health than expected.

Key-words: mental health, communication, parent, adolescent, gender

Introduction

Mental Health in Dutch Adolescents and the Role of Parental Communication: A Gendered Perspective

Adolescence is a crucial phase as individuals transition from childhood to adulthood (Brooks et al., 2015), where they can be faced with many challenges, such as mental health problems (Patel et al., 2007). Adolescent mental health has become one of the top challenges for public health (WHO, 2015) due to a high prevalence during this phase of life (Hassett et al., 2018). Worldwide, in 2019, an estimated 80 million adolescents between the ages of 15 and 19 had a mental disorder, with internalising problems (such as anxiety and depression) making up approximately 40 per cent of the disorders (UNICEF, 2021). Despite Dutch children being considered the happiest in the world, high rates of mental health problems are still visible among adolescents in the Netherlands (UNICEF, 2021).

Adolescents during this phase of life are influenced by several factors, such as environmental and individual factors (Patel et al., 2007). Parent-adolescent communication is an example of a possible influential factor that could affect adolescents' mental health (Kobielski, 2002). For example, adolescents are less likely to report low life satisfaction if they communicate well with their mother and/or father (Ormel et al., 2015). This research considers the gender of parents and adolescents, as it could play a role in the relationship between parent-adolescent communication and mental health. For example, a study indicated that adolescents reported more negative problems when communicating with fathers than mothers (Shek, 2000). This study will therefore investigate the relationship between parent-adolescent communication and the mental health of adolescents from a gendered perspective.

Improving and researching mental health in adolescents can be beneficial for many reasons. Previous research suggests that the mental health burden during adulthood is likely

due to problems developed during adolescence (Ormel et al., 2015; Hassett et al., 2018). Because of these problems, a significant social and economic burden exists on individuals, families, and societies (Lynch & Clarke, 2006). According to the WHO, mental disorders in many high-income European countries rank the highest in disease burden. Many unemployed people and people receiving social welfare benefits have mental disorders, causing economic strain in many European countries (2015). Adolescents with relatively mental health tend to be physically healthier, more socially positive and engage in fewer risky behaviours (Jahan & Suri, 2016). In contrast, mental health problems are related to lower educational achievements, substance abuse, violence, and poor reproductive and sexual health (Patel et al., 2007). This can explain why mental health in adolescents is becoming a top priority in public health policy (Van Droogenbroeck et al., 2018).

Parent-Adolescent Communication and Mental Health

Due to this global burden, it is essential to understand the protective factors that influence these problems (UNICEF, 2021). Protective factors buffer risk factors that may otherwise compromise children's development; for example, they control against non-normative activities (the quality of relationships with family) (Dekovic, 1999). These factors are especially important in understanding how the effect of risk factors can be modified and eliminated (Patel et al., 2007), promoting social development during adolescence stages (Dekovic, 1999).

Parents and peers have the most significant impact on the behaviour and feelings of adolescents. Over a few decades, social scientists have debated whether parents or peers are more influential (Biddle, 1980), as the older the adolescent, the more independent from their parents they become (Dailey, 2006). Despite this, it is still clear that parents continue through adolescence to play an influential role in their children (Hassett et al., 2018). Although

adolescents strive toward autonomy the older they get, research indicates that openness in parent-adolescent relationships is still of importance (Dailey, 2006; Zhou et al., 2021).

There are empirical and theoretical reasons to think ease of communication with parents is an essential protective factor (Todd et al., 2007; Brooks et al., 2015). The theory on attachment by Bowlby provides a developmental perspective into an understanding of parent-adolescent attachment (1982). Securely attached adolescents experience fewer mental health problems, and insecure attachments can result in issues later in life (Brumariu, 2015). Ease of communication allows for expressing emotions and feeling a sense of closeness (Van Droogenbroeck et al., 2018) which can protect against the development of problems (Patel et al., 2007). Parent-adolescent communication is a strong determinant of the mental health of adolescents (Brooks et al., 2015; Kobielski, 2002). Previous research found that the mental health of an adolescent can be affected negatively by unsupportive parents (Levin & Currie, 2010). Therefore, research on parental communication and adolescent mental health is relevant. Although the relationship between parenting and adolescent outcomes has been examined, the differences between mother and father associations have received less attention (Shek, 2000; McKinney & Renk, 2008).

Differences in Mother and Father communication on Mental Health

There is a possibility that differences can be found between mother and father communication in the mental health of adolescents. As attachment theory suggests, adolescents have reported support from mothers as a safe haven and support from fathers as a secure base (Brumariu, 2015), suggesting that mothers and fathers play different roles in their relationships with adolescents. Father-adolescent and mother-adolescent communication seem to have different effects on the adolescent's mental health (Levin & Currie, 2010).

It was found that over the past few years, in some countries, there has been an increase in the quality of communication between adolescents and their fathers. This suggests

that there has been a qualitative change in the nature of fathering and interaction with their children (Brooks et al., 2015). Although, mother-adolescent relationships still play a particularly important role (Levin & Currie, 2010). A study has shown that there was less communication between the adolescent and their fathers, and more negative feelings were reported when communicating with their fathers compared to their mothers (Shek, 2000). When thinking about gender in this case, not only the gender of the parent plays an important role, but the gender of the adolescents themselves too (Mckinney & Renk, 2008).

Gender Differences in Adolescents

Across Europe, there are substantial differences between adolescent boys and girls in their mental health. This gender gap becomes clear during adolescence, which then may contribute to the higher prevalence of mental health problems in adult women (Campbell et al., 2021; Hammen, 2009). Generally, mental health among adolescent boys tends to be less prevalent compared with girls (King et al., 2006). Girls in almost every age group and country were more likely to experience problems such as anxiety and depression (King et al., 2006; Kobielski, 2002), and boys are at a lower risk of such mental health problems (Hassett et al., 2018), including Dutch adolescent boys (Ormel et al., 2015). On the other hand, research shows that adolescent boys tend to be more at risk of externalising behaviour problems (Van Droogenbroeck et al., 2018; Mckinney & Renk, 2008). Gender differences may not be fully understood, but reasons could be that girls experience more restricted gender roles, are expected to be more emotionally sensitive and ruminate more as a coping mechanism, whereas boys tend to mask their mental health problems by acting out (Van Droogenbroeck et al., 2018). These gender differences can also be seen in parent-adolescent communication as, for example, girls are more likely to have stronger communication with both parents than boys (Noller & Callan, 1990).

Different Parent-Adolescent Relationships

During adolescence, mothers and fathers play different roles when it comes to the development of the individual and this is further dependent on the gender of the child (Levin & Currie, 2010). This study has a gendered perspective as it examines the relationship between father and mother, son, and daughter and the association of parent-adolescent communication with the mental health of adolescents. To understand the differences in mother and father relationships with the adolescent, the sex-role theory by Gove (1972) can support this. This theory indicates that mothers have a bigger influence on the female child while fathers have a bigger influence on the male child. This can be explained as females tend to show high levels of expressiveness while males have similar levels of instrumentality, resulting in the possibility of mothers adopting a warmer style of parenting and fathers a more goal-orientated (Mckinney & Renk, 2008).

A study suggests a differences in gender in ease of communication with parents, as girls were more than twice as likely to report difficult communication with their father as with their mother (Levin & Currie, 2010). Girls, compared to boys, tend to report stronger communication with mothers than with fathers (Noller & Callan. 1990). This research could indicate that mothers, compared to fathers, are generally more associated with the mental health of adolescents and this association is stronger for girls, compared to boys.

Research Question and Hypotheses

The main research question of this study is: What is the association between parental communication and the mental health of Dutch adolescents? How does this association differ by parent and adolescent gender?

To conclude, mental health problems are prevalent among adolescents and based on the literature, there seems to be an association between parent-adolescent communication and

mental health. Although literature already exists on the main research topic of this study, there have been few studies found that have particularly examined the different parent-adolescent relationships, especially among Dutch adolescents. The strength and differences of these relationships are also unclear. Attachment theory and sex-role theory give the reasoning for this study's observations and allow for hypotheses to be produced. Four hypotheses were formed as a result:

Hypothesis 1-

This study compares the four relationships: mother-daughter, mother-son, father-daughter, and father-son. It is hypothesised that:

- a) Father communication, compared with mother, is more strongly associated with the mental health of boys when compared with girls. (both internalising problems and life satisfaction)
- b) Mother communication, compared with father, is more strongly associated with the mental health of girls when compared with boys (both internalising problems and life satisfaction)

Hypothesis 2-

The association between mental health (both internalising problems and life satisfaction) and parent-adolescent communication differs depending on the gender of the adolescent. This association is stronger for girls than it is for boys.

Hypothesis 3-

Communication with mother, compared to father, is more strongly associated with the mental health of adolescents (both internalising problems and life satisfaction).

Hypothesis 4-

- a) There is a negative relationship between parent-adolescent communication and adolescent rates of internalising problems.
- b) There is a positive relationship between parent-adolescent communication and life satisfaction rates of adolescents.

Interdisciplinary approach

The approach of this study can be seen as interdisciplinary for multiple reasons. Sex-role theory and attachment theory are developed from different backgrounds which include the subject's sociology and psychology. The study of mental health and parent-adolescent communication is also interdisciplinary as the economy, public health, different areas of psychology, and sociology are touched on. Interdisciplinary thinking is needed to combine the different aspects of this study too. All of these factors create this interdisciplinary study.

Methods**Design and Sample**

This study used data from the Dutch Health Behaviour in School-aged Children (HBSC) survey 2017. HBSC is conducted every four years since 1985/86 and aims to examine the health behaviour of adolescents in many countries, including The Netherlands (Inchley et al., 2017), making it a suitable dataset for this research. Data collected in October and November of 2017 was used for this study and was collected through digital self-completion questionnaires on topics such as Family Culture and Health and Well-Being. A two-stage random sampling procedure was used and the pupils that participated in the study were situated in mainstream schools where they completed the questionnaire in a classroom setting, under the supervision of the teacher. The original sample of this data consisted of

8306 adolescents before any data was removed. HBSC was approved by relevant ethical boards, consent was obtained, and participation was voluntary.

The participants who did not report on all the items of at least 1 of the research variables, participants who answered, “don’t have or see this person” to the question ‘How easy is it for you to talk to the following persons about things that really bother you?’ and the subject stepfather, stepmother and partner from the variable ease of communication, were excluded from the analysis ($N=718$). Due to the size of the dataset, the data remained almost the same for the variables. The research sample ended up consisting of 7588 adolescents with 48.5% being boys and a mean age of 13.34 years old. Moreover, almost 80% of the adolescents had a Dutch migration background. Examples of non-Dutch backgrounds include Turkish and Moroccan. Table 1 below displays the demographics in more detail.

Measures

Mental health

The dependent variable mental health consisted of two measurements: *internalising problems* and *life satisfaction*. *Internalising problems* consist of two scales which are the emotional problems scale and the peer problems scale, both measured on a 3-point Likert scale. On this scale, a lower score indicates better levels of mental health compared to a higher score indicating worse mental health. the answers ranged from 1= not true; 2= slightly true; 3=very true. Examples of statements include ‘I am often unhappy’ on the scale of the emotional problem and ‘other children or young people pick on me’ on the scale peer problems. The sum of both scales was taken to create the variable *internalising problems* which now range from 0-4. Evidence from previous studies proves the reliability and validity of SDQ (Muris et al., 2003).

The second measure was *life satisfaction* where the Cantril Ladder (an 11-point ladder) was used as an indicator of how satisfied the adolescent was with their life (Cantril, 1965). Adolescents were asked to rate their life on a scale of 0-10, with 0 being ‘worst possible life’ to 10 being ‘best possible life’. The Cantril Ladder has been used many times and has been validated, showing reliability among adolescents (Levin & Currie, 2014).

Ease of communication with parents

The main independent variable in this study was the ease of communication with parents. This was measured through reported ease of communication with different family members on a 4-point Likert scale. One scale was taken out of the original 5 as it answered, ‘don’t have or see this person’, as it does not indicate communication with father or mother. The subjects included father, stepfather, mother, stepmother and partner. Only father and mother were used due to the relevance of this study. Adolescents were asked how easy it is for them to talk to people in their family about things that really bother them. Responses to this question ranged from 1 (‘very difficult’) to 4 (‘very easy’). Originally, high scores on this scale indicated more difficult communication so the scale was re-coded where a high score indicated the easiest communication. Results from previous international studies using this scale have shown it has very good reliability (Brooks et al., 2015).

Gender

The second independent variable was gender which was measured by asking the adolescent if they are a girl or a boy. This was done through the standard questionnaire validated in the HBSC surveys. Gender was re-coded so that the value 0 was girls and the value 1 was boys (binary scale).

Control variables

Two other variables have been used in this study to ensure that other variables did not greatly affect the measured variables. The two variables included as controls were *age* and *migration background*. The adolescent was asked about the month and year in which they were born, which was then used to calculate their age (continuous scale). Migration background was included as a dummy variable with the value 0 as non-Dutch and the value 1 as Dutch (binary scale).

Data Analysis

To analyse the collected data from the HBSC study, IBM SPSS Statistics 25 was used. After the removal of all unwanted/missing data, descriptive statistics were run to display the general characteristics of the sample. Then, correlations of all the study variables were computed. Assumptions for regression analysis were checked for regression analysis to be run and all assumptions ended up being clear. The dependent variable mental health consisted of two measures which were life satisfaction and internalising problems, which meant they had to be tested separately. Gender was also used in this study as an independent variable, which also meant boy and girl analyses were run separately too. This was done by splitting the gender file. To test the four hypotheses for this research, multiple regression analyses were run. The control variables age and migration background were included in all analyses. The difference between the regression coefficients (B's) were tested in order to examine the hypotheses of this study.

Results

Descriptive Statistics and Correlations

Descriptive statistics and correlations for the study variables are shown in Table 1. The average scores for the mental health variables indicated relatively good adolescent levels.

Boys reported lower internalising problems ($M = .34$, $SD = .81$) compared to girls ($M = .60$, $SD = 1.02$), with scores ranging from 0 (lowest level of internalising problems) to 3 (highest level of internalising problems). Boys also reported higher life satisfaction ($M = 8.0$, $SD = 1.41$) compared to girls ($M = 7.51$, $SD = 1.58$) on a scale of 0-10, with 10 being the highest rate. This suggests boys had slightly better levels of mental health compared to girls. Parent-adolescent communication levels also scored relatively high. Boys found it easier to communicate with their father ($M = 3.34$, $SD = .74$) and mother ($M = 3.51$, $SD = .67$) compared to girls ($M_{father} = 3.08$, $SD = .85$, $M_{mother} = 3.46$, $SD = .73$) on a scale of 1-4, with 4 being the easiest level of communication. Both boys and girls found it easier to communicate with their mother compared to their father. Parent-adolescent communication positively correlated with life satisfaction ($r_{Boy} = .31$, $r_{Girl} = .26$) and negatively correlated with internalising problems ($r_{Boy} = -.155$, $r_{Girl} = -.26$).

Correlations from Table 1 also show that the control variables migration background and age had slight/no correlations with internalising problems and life satisfaction. Age had a higher correlation with internalising problems, particularly for girls ($r = .12$, $p < .001$) compared to boys, with no correlation. This suggests that older, compared to younger, female adolescents scored higher on internalising problems. Age also had a higher correlation with life satisfaction particularly for girls ($r = -.28$, $p < .001$) compared to boys ($r = -.20$, $p < .001$). These negative relationships suggest that older adolescents, compared to younger, scored lower on life satisfaction.

Table 1
Descriptive statistics and correlations for Study Variables (N=7588).

Variables	1	2	3	4	5	6	M	SD
<i>Mental Health</i>								
1. Internalising problems	---	-.25*	-.17***	-.14***	-.07***	-.00	.34	.81
2. Life satisfaction	-.46*	---	.31***	.31***	-.02	-.20***	8.0	1.41
<i>Parent-Child Communication</i>								
3. Communication with father	-.27***	.43**	---	.61***	.61***	-.10***	3.34	.74
4. Communication with mother	-.25***	.42**	.54***	---	.02	-.13***	3.51	.67
<i>Control Variables</i>								
5. Migration background ^a	.04**	.01	.07*	.03	---	-.01		
6. Age	.12***	-.28***	-.19***	-.17***	-.01	---	13.35	
M	.60	7.51	3.08	3.46		13.34	---	
SD	1.02	1.58	.85	.73				
R	0-4	0-10	1-4	1-4		10-16		---

Note: Correlations above the diagonal line represent males and females below the diagonal. *M*= mean, *SD*= standard deviation *R*= range. $p > .001$ ***, $p > .01$ **, $p > .05$ * (1-tailed). The range below the diagonal line represents both genders as no difference was found. ^a= Reference category: non-Dutch.

Multiple Regression

Multiple linear regression analyses were conducted for boys and girls separately, to examine if communication with father, compared to mother, was more strongly associated with boys' mental health compared to girls, and vice versa for the association strength between mothers and girls. The results for this are shown in Table 2. For internalising problems, differences in mother and father communication in boys were examined first. It was found that communication with father ($B = -.14$) had a significantly stronger association with boys' internalising problems compared to mother ($B = -.07$). Next, communication with

father was compared with boys' and girls' internalising problems. Communication with father was significantly stronger in association with girls' internalising problems ($B = -.22$) compared to boys ($B = -.14$).

Differences in mother and father communication on girls' internalising problems were then examined. Results showed that the difference between communication with mother and communication with father on girls' internalising problems was not significant. Although, there was a significant difference when comparing communication with mother on boys' and girls' internalising problems. There was a significantly stronger association of communication with mother on girls' internalising problems ($B = -.19$) compared to boys ($B = -.07$).

For life satisfaction, results suggest that there was no significant difference in the association between communication with mother and communication with father on boys. Although, there was a significant difference between communication with father on boys' and girls' mental health. There was a stronger association between communication with father and girls ($B = .49$) life satisfaction compared to boys ($B = .35$).

Differences in mother and father communication on girls' life satisfaction were then examined. There was no significant difference in communication with mother and father on girls' life satisfaction. Although, communication with mother showed a significantly stronger association with girls ($B = .53$) life satisfaction compared to boys ($B = .36$).

Table 2

Multiple linear regression analysis of parent-child communication on mental health for boys and girls, respectively.

Variables	Boy			Girl		
	B(CI)	β	P	B(CI)	β	P
Internalising problems						
Communication with father	-.14[-.19, -.10]	-.13	< .001	-.22[-.26, -.18]	-.18	< .001
Communication with mother	-.07[-.12, -.02]	-.06	.004	-.19 [-.24, -.14]	-.14	< .001
Age	-.01[-.03, .00]	-.02	.141	.04[.02, .06]	.06	< .001
Migration background	-.12[-.19, -.06]	-.06	< .001	-.05[-.13, .02]	-.02	.161
Life Satisfaction						
Communication with father	.35[.28, .43]	.19	< .001	.49[.43, .55]	.26	< .001
Communication with mother	.36[.28, .44]	.17	< .001	.53[.46, .60]	.24	< .001
Age	-.13[-.16, -.12]	-.16	< .001	-.18[-.21, -.15]	-.19	< .001
Migration background	-.10[-.21, .01]	-.03	.061	-.07[-.18, .03]	-.02	.164

Note. B= unstandardized score, β = standardized Beta, CI= 95% confidence interval, P= significance.

Comparing coefficients

The results after testing if the association between mental health and parent-adolescent communication was stronger for girls than boys can also be seen in Table 2. The association between internalising problems and parent-adolescent communication was stronger for girls (Bfather= -.22, Bmother= -.19) than it was for boys (Bfather= -.14, Bmother= -.07). For life satisfaction and parent-adolescent communication, it was also stronger for girls (Bfather= .49, Bmother .53) than it was for boys (Bfather= .35, Bmother= .36). All of the comparisons included in this were significant as each variables coefficients were located outside of the 95% confidence intervals.

Coefficients of the independent variables were compared to examine if communication with mother was more strongly associated with adolescent mental health compared to communication with father. Results from table 3 show that, with internalising problems, coefficients of communication with mother and father are located outside of their confidence intervals, indicating that they differ significantly. Communication with father is seen to have a stronger association with internalising problems of adolescents ($B = -.19$, $p < .001$), compared to communication with mother ($B = .14$, $p < .001$). On the other hand, life satisfaction results show that the coefficients for communication with mother and father are not located outside of their confidence intervals. This indicates that they do not significantly differ, and the association between communication with mother ($B = .44$, $p < .001$) and father ($B = .45$, $p < .001$) on adolescent life satisfaction is the same.

Results from Table 3 show the relationship between the independent variables parent-adolescent communication and mental health. It is clear from this table that the relationship between parental communication (both father and mother with adolescent) with internalising problems was found to be negative. Also, the relationship between parental communication (both father and mother with adolescent) with life satisfaction was found to be positive.

Table 3
Comparing coefficients of independent variables.

Variables	B(CI)	β	P
Internalising problems			
Communication with father	-.19[-.22, -.16]	-.17	<.001
Communication with mother	-.14[-.17, -.10]	.10	<.001
Age	.02[.00, .03]	.03	<.05
Migration background	-.09[-.14, -.02]	-.04	<.001
Life satisfaction			
Communication with father	.44[.39, .48]	.23	<.001
Communication with mother	.45[.40, .50]	-.21	<.001
Age	-.16[-.18, -.14]	-.17	<.001
Migration background	-.09[-.16, -.01]	-.06	<.05

Discussion

This study investigated parent-adolescent communication and the mental health of Dutch adolescents. It particularly examined the association between these two variables, and whether differences exist when mother and father, and girl and boy were tested separately. This study had some expected results and some surprising. Communication with father and mother, tested separately and combined, had a stronger association with the mental health of girls when compared with boys. With internalising problems, results indicated that communication with father, compared with mother, had a stronger association with the mental health of adolescents, while life satisfaction was the same for both. In general, a positive relationship was found between parent-adolescent communication and life satisfaction and a negative relationship with internalising problems.

The first hypothesis was not able to be completely tested. It was hypothesised that communication with father, only when compared with mother, would be stronger in association with the mental health of boys, compared with girls, and vice versa with mother and girls. With Hypothesis 1 internalising problems, this was successfully tested as the difference in communication with father and mother was significantly different for boys, therefore it could be compared with girls. Although, this was rejected as findings suggest the association was stronger for the internalising problems for girls. This finding could be explained due to girls generally having higher levels of internalising problems (King et al., 2006; Kobielski, 2002; Ormel et al., 2015). Future research could include externalising problems as an independent variable, as boys tend to experience this more than internalising problems (Van Droogenbroeck et al, 2018; McKinney & Renk, 2008).

With the rest of the first hypothesis, there were no significant differences between communication with father and mother on boys' life satisfaction and girls internalising problems and life satisfaction. Therefore, mother and father could not be compared. Although, some significant differences were found when examining the parents individually. All other associations (communication with mother and communication with father on life satisfaction and internalising problems) were stronger for the mental health of girls when compared with boys. Findings were the same when parents were considered together, which then proved hypothesis 2 that both communication with mother and father and has a stronger association with girl's mental health than boys.

Another interesting find was that the association of parent-adolescent communication on internalising problems was more strongly associated with father when compared with mother. Next, there was no significant difference found between communication with mother and father on life satisfaction, indicating that they both have the same strength association for adolescents. These unexpected results reject the third hypothesis communication with mother,

compared to father, is more strongly associated with the mental health of adolescents. There could be several reasons why communication with mother did not have a stronger association. In recent years, there have been cultural changes in attitudes towards parenting, especially with fathers as there was a positive shift in communication with father an adolescent. (Brooks et al., 2015). This could be explained by the shift in domestic gender roles, as the importance of the father's role in child development is recognised and they are becoming more involved in the care of children (Brooks et al., 2015; Mckinney & Renk 2008).

Lastly, findings from this study confirm that there is indeed a negative relationship between parent-adolescent communication and adolescent internalising problems and a positive relationship with life satisfaction. This hypothesis had been assumed due to previous research and the theory of attachment (Brumariu, 2015; Brooks et al., 2015; Kobielski, 2002). From these findings, advice that can be taken for policy and interventions would be an increased encouragement for parent-child communication, more consideration for adolescent girls in relation to mental health and recognition of the increasing role that fathers play in child development.

This study comes with multiple strengths, one being the reliability of the results. This is due to the large sample size that was used, allowing the results to be more precise (Neuman, 2014). This study also used multiple indicators of mental health, although for future research, including externalising behaviours is recommended.

Despite these strengths, there are also multiple limitations of this study that should be mentioned. First, it is limited by the cross-sectional nature of the dataset. There is no way to establish causality in the relationship between parent-adolescent communication and mental health. However, previous research has shown that the family environment predicts

adolescent mental health, rather than the other way around (Sheeber et al., 2001). The mechanism used to collect the data for this research was a self-report survey which could have led to untruthful responses from the participants. They may have reported lower levels of mental health problems to look better (Neuman, 2014). Although, both the Cantril Ladder for measuring life satisfaction and the Strength and Difficulties questionnaire measuring internalising problems have proven to be reliable and valid (Levin & Currie, 2014; Muris et al., 2003). For future research, a parent report could also be a data collection method to improve results reliability and to back up the answers provided by the adolescents.

Another limitation in this study is that the stepmother and stepfather were not included as independent variables in relation to communication. A cross-sectional multilevel analysis found that stepparents were moderators in the association between parent-adolescent life satisfaction (Levin & Currie 2014), indicating that it could have played a role in this study. This could be included in future research. Also, age was used as a control variable in this study, although for future research, it could be included as an independent variable. Previous studies have shown that it plays a role in parent-adolescent communication and the mental health of adolescents (Campbell et al., 2021; Todd et al., 2007) and could be explored as a moderator. Ease of communication with mothers and fathers declines with adolescent age along with mental health (Todd et al., 2007), making it a relevant aspect.

In conclusion, this study found a significant relationship between parent-adolescent communication and the mental health of Dutch adolescents. There was a positive relationship between communication and life satisfaction, and a negative relationship between internalising problems. Additionally, it was found that the mental health of adolescent girls had a significantly stronger association with parent-adolescent communication when compared with boys. Gender was not found to have such differences that were expected. Although, communication with the father was found to have a stronger association in general

with the mental health of adolescents than what was expected. Overall, mental health among adolescents and the factors that determine it is clearly an important topic and deserves future research.

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Appendices For quantitative research: instruments and data analysis syntax used

Appendix 1:

PIAMA Data Ethical Approval

The Medical Ethical Committees of the participating institutes approved the study (Rotterdam, start project MEC 132.636/1994/39 and 137.326/1994/130; Groningen, start project MEC 94/ 08/92; Utrecht, start project MEC-TNO judgement 95/50; Utrecht, age 4 years CCMO P000777C; Utrecht, age 8 years CCMO P04.0071C, protocol number 04-101/K; Rotterdam, age 8 years MEC 2004–152; Groningen, age 8 years M4.019912; Utrecht, age 12 years METC protocol number 07-337/K). Parents, carers, or guardians gave written informed consent on behalf of all the minors/children involved in the study.

Data Availability Statement: The data underlying the findings presented in this paper are available on request. Requests can be submitted to the PIAMA Principal Investigators. Their names and e-mail addresses are listed on the PIAMA website (<http://piama.iras.uu.nl/english>). The PIAMA data are not freely accessible in the public domain, because this would be in conflict with the agreement between the PIAMA study team and the PIAMA participants. The information participants received at the start of the study (in 1996-1997) included the statement information that we receive from you will only be used for the PIAMA project' and participants gave written informed consent based on this information.

Wijga AH, Kerkhof M, Gehring U, Jongste D, C J, Postma DS, et al. Cohort profile: The Prevention and Incidence of Asthma and Mite Allergy (PIAMA) birth cohort. *Int J Epidemiol.* 2014; 43:527–35. [https:// doi.org/10.1093/ije/dys231](https://doi.org/10.1093/ije/dys231) PMID: 23315435

For all other documents, please see PIAMA website and/or contact

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Appendix 2:

HBSC codebook https://www.uib.no/sites/w3.uib.no/files/attachments/hbsc-2013_14_ed.1.0.pdf

Appendix 3:

SPSS Syntax

Encoding: UTF-8.

DATASET ACTIVATE DataSet2.

RECODE gender (1=1) (2=0) INTO dummy_boy.

VARIABLE LABELS dummy_boy 'Boy'.

EXECUTE.

RECODE ethnic background (1=1) (2=0) INTO dummyethnic

EXECUTE

```
RECODE fath_comm (2=3) (3=2) (4=1) (1=4) INTO fathercomm.
```

```
EXECUTE.
```

```
RECODE moth_comm (2=3) (3=2) (4=1) (1=4) INTO mothercomm.
```

```
EXECUTE.
```

```
COMPUTE SDQ=SUM(sdqem2 + sdqpeer2) .
```

```
EXECUTE.
```

```
FREQUENCIES VARIABLES=lifesat SDQ mothercomm fathercomm ethnic age
```

```
  /NTILES=4
```

```
  /STATISTICS=STDDEV VARIANCE RANGE MINIMUM MAXIMUM MEAN MEDIAN MODE SUM
```

```
  /ORDER=ANALYSIS.
```

```
REGRESSION
```

```
  /MISSING LISTWISE
```

```
  /STATISTICS COEFF OUTS CI(95) R ANOVA
```

```
  /CRITERIA=PIN(.05) POUT(.10)
```

```
  /NOORIGIN
```

```
  /DEPENDENT lifesat
```

```
  /METHOD=ENTER ethnic mothercomm fathercomm age.
```

```
  /RESIDUALS DURBIN
```

```
  /SCATTERPLOT=(*ZRESID ,*ZPRED).
```

```
REGRESSION
```

```
  /MISSING LISTWISE
```

```
  /STATISTICS COEFF OUTS CI(95) R ANOVA
```

```
  /CRITERIA=PIN(.05) POUT(.10)
```

```
/NOORIGIN  
/DEPENDENT SDQ  
/METHOD=ENTER ethnic mothercomm fathercomm age.  
/RESIDUALS DURBIN  
/SCATTERPLOT=(*ZRESID ,*ZPRED).
```

SORT CASES BY dummyboy.

SPLIT FILE LAYERED BY dummyboy.

REGRESSION

```
/MISSING LISTWISE  
/STATISTICS COEFF OUTS CI(95) R ANOVA  
/CRITERIA=PIN(.05) POUT(.10)  
/NOORIGIN  
/DEPENDENT lifesat  
/METHOD=ENTER ethnic mothercomm fathercomm age.  
/RESIDUALS DURBIN  
/SCATTERPLOT=(*ZRESID ,*ZPRED).
```

REGRESSION

```
/MISSING LISTWISE  
/STATISTICS COEFF OUTS CI(95) R ANOVA  
/CRITERIA=PIN(.05) POUT(.10)  
/NOORIGIN  
/DEPENDENT SDQ  
/METHOD=ENTER ethnic mothercomm fathercomm age.  
/RESIDUALS DURBIN  
/SCATTERPLOT=(*ZRESID ,*ZPRED).
```