The Impact of COVID-19 on the Relation Between Social Media Use and Social Competence

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Abstract

During the COVID-19 pandemic, social media suddenly replaced face-to-face communication with peers. This might have affected student's social competence. Social competence affects the ability to learn through social learning, and is a determining factor for academic advancement. This study investigates the relation between the intensity of social media use and change in perceived social competence during COVID-19. Also, the moderating roles of media motivation and socioeconomic status and mediating role of self-esteem are investigated. Hereto, a longitudinal design was executed, using data from the Digital Family project. A questionnaire, measuring Intensity of Social Media Use, Perceived Social Competence, Media Motivation and Self-esteem was filled in by 206 adolescents. Their parents provided data about the Socioeconomic Status of the family. The analyses found no significant relationship between the intensity of social media use and social competence change. Additionally, the moderation and mediation analyses provided no significant results. This study provided insight into significant relationships that can be used to help media literacy initiatives identify factors that contribute to the susceptibility of individuals to media effects. It is recommended that future research aims to distinguish passive and active media use when investigating media effects.

Keywords: Social competence, social media use, COVID-19, adolescents, longitudinal study

The Impact of COVID-19 on the Relation Between Social Media Use and Social Competence

During the COVID-19 pandemic, social media became a replacement for face-to-face communication, causing visits to different social media sites to increase with 67% globally (Dahiya et al., 2021; Pandya & Lodha, 2021). During the pandemic, adolescents were suddenly almost fully dependent on online media for connection with peers (Pandya & Lodha, 2021). This provided a sense of community, support and connectedness in a time of physical isolation (Branje & Morris, 2021; Hamilton et al., 2022). However, adolescents were not able to develop according to their biological and psychological nature, since they were physically isolated from their peers and were forced to communicate with less interpersonal cues (Hamilton et al., 2022).

This dependence on online connection during COVID-19 has brought its challenges to the educational field. Social learning theory states that interaction with peers is essential for knowledge construction (Hill & West, 2009) and social context has been found to be an important determining factor in the development of knowledge (Yarberry & Sims, 2021). Additionally, adolescents are in a developmental phase where they highly depend on peer relations (Branje & Morris, 2021; Hamilton et al., 2022). Since the context of peer-interaction and peer-relations changed severely during the COVID-19 pandemic, it is interesting to investigate what implications this enhanced dependence on social media has for the socioemotional development of adolescents. One important factor in the socioemotional development that might be affected is the perceived social competence of adolescents.

Social competence can be defined as “the ability of an individual to optimise its social behaviour depending on available social information” (Taborsky & Oliveira, 2012, p. 679). Social competence has been found to be a determining factor in adolescents’ mental health development (Holopainen et al., 2012; Romppanen et al., 2021). It is associated with fewer

internalizing problems in adolescence and higher adaptive functioning in adulthood (Romppanen et al., 2021). Additionally, social competence affects the ability to learn through social or intercultural learning and socially competent children have been found to advance in academics more quickly (Junge et al., 2020; Seeber & Wittmann, 2017). The ability to adapt to social situations (an important factor of social competence) is also often a goal of education itself; it is seen as a detrimental competence for adult life (Zwaans et al., 2006). Since social competence is heavily reliant on context, Junge et al. (2020) recommend to investigate the effect of online interaction through social media on social competence. This is due to the different affordances online interaction has for interaction compared to face-to-face contact.

This paper aims to investigate the relation between the intensity of social media use and social competence of adolescents during the COVID-19 pandemic. Hereto, first the concept of social competence will be elaborated. Second, moderators and a possible mediator of the relation between social media use and social competence will be discussed. The central research question in this paper is as follows: “To what extent does social media use relate to the change of social competence over time during the COVID-19 pandemic and how is this effect moderated by media motivation and socioeconomic status and mediated by self-esteem?”.

Social Competence

Social competence relies on both the individual’s capabilities and the social context (Junge et al., 2020). Rose-Krasnor (1997) indicates that only when both the individual and the contextual needs are met, social competence is achieved. Therefore, social competence should not solely be measured by the self-efficacy that is experienced. It also encapsulates a sense of connectedness, which can be measured through the experienced quality of friendships.

As achieving social competence revolves around meeting needs of the self and others, the measure of social competence cannot be regarded as a fully objective measure. This is

because it is dependent on contextual and personal values (Schoon, 2009), and individual social skills and the developmental stadia in which these skills unfold (Junge et al., 2020). Therefore, it needs to be elucidated that this paper aims to measure the perceived social competence, rather than it aims to achieve an objective measure of competence.

Social competence is thus considered to be a multifaceted concept, consisting of individual, contextual and developmental aspects. It is therefore necessary to investigate the relation between social media use and social competence over time. As Schoon (2009) states: "there is still too little knowledge about how individuals learn and acquire social competencies in different contexts and settings, and how competencies develop and diversify over time." (p. 11). Consequently, this study will focus on the relationship between social media use and social competence change over time.

Intensity of Social Media Use and Social Competence

As stated before, during COVID-19, adolescents heavily relied on social media to connect with peers, resulting in a higher intensity of social media use (ISMU) (Pandya & Lodha 2021). How does this increase in ISMU (meaning; the amount of social media use) affect social competence? A review study by Pandya & Lodha (2021) has found that more intense or even unregulated social media use can lead to an increase in internalizing problems, and a greater risk for mental health problems.

Social competence has been found to be negatively correlated with internalizing problems over time (Romppanen et al., 2021). Additionally, the experimental study of Gable and Shean (2000) has found that depression negatively correlates with perceived social competence by peers. One longitudinal study has found a bidirectional positive relation between psychological well-being and social competence (Gómez-López et al., 2022).

By assessing the negative relations between social media use and mental health, and the positive correlations between psychological well-being and social competence, an overall

negative relation between ISMU and social competence can be expected. However, no studies investigate the immediate relation between social media use and social competence change over time. This study will further examine this relation. The following is hereby hypothesized:

H1: There is a negative relationship between the intensity of social media use and the change in social competence over time during the COVID-19 pandemic.

Media Motivation and Social Competence

As Selfhout et al. (2009) point out, internet (and thereby social media) is used for different activities and for different reasons. For example, adolescents may want to stay in touch with the news, they seek connection with peers online, or they want to display their lives to others. These different motivations for media use seem to impact well-being and social competence differently (Selfhout et al., 2009). They are thereby crucial to examine when researching the relation between social media use and adolescent's socioemotional well-being (Hamilton et al., 2022).

Media Motivation for Connection

Much research has been done on the 'social compensation' and the 'rich-get-richer' theories (Desjarlais & Willoughby, 2010; Reich, 2017; Selfhout et al., 2009). The social compensation theory states that people who have difficulty forming relationships in offline interaction, due to for example social anxiety, seek online interactions to compensate for the lack of social competence they experience in face-to-face contact (Poley & Luo, 2012). Reich (2017) found that adolescents with low self-esteem have a higher ISMU and actively use social media to seek connection to peers online. This contributes to a higher sense of offline connectedness to peers (Reich, 2017; Selfhout et al., 2009). It seems that the lack of behavioural skills that withhold these youths in forming and maintaining friendships offline, is not an impairing factor in online communication (Reich, 2017). This may be due to the fact

that in online communication, communication is more reliant on text, affording adolescents more time to come up with responses (Hamilton et al., 2022). Social compensation research thus suggests that adolescents with low self-esteem use social media more to seek connection and as a result experience increased social competence.

The rich-get-richer theory states that people that have strong social skills and are able to connect well with people offline, are also able to connect better online than their less skilful peers (Poley & Luo, 2012). Social media used with the motivation for connection has been found to support the feeling of connectedness with peers for females with a high social skill level, confirming the rich-get-richer theory for this group (Desjarlais & Willoughby, 2010; Reich, 2017). This is likely so because females' friendships are more interaction-based, whereas males value joined activities more (Desjarlais & Willoughby, 2010). Thus, both for individuals with low self-esteem, as well as for females with a high social skill level, social media motivation for connection seems to positively moderate the relation between ISMU and social competence. The following is therefore hypothesized in this study:

H2a: The relation between the intensity of social media use and social competence is influenced by media motivation for connection, reducing the negative long-term relationship.

Media Motivation for Self-validation

Other research suggests that social media used with the motivation for self-validation might lead to decreased social competence (Vogel et al., 2014; Yang; 2016). Self-validation is seen as the reliance of self-worth on approval of others (Stapleton et al., 2017). Social media has a great affordance for social comparison (Vogel et al., 2014). Media motivation for self-validation often leads to increased feelings of inadequacy through the process of social comparison (Vogel et al., 2014; Yang, 2016). Social media users that are inclined to use social media with the motivation to compare themselves to others, benefit less from the

positive effects social media can have on the experience of social connectedness (Yang, 2016).

Thus, it seems that the relation between the intensity of media use and feelings of social competence are possibly moderated by media motivation for self-validation; when media is used for self-validation, the intensity of social media use seems to have a negative relation to social competence. The following is therefore hypothesized in this study:

H2b: The relation between the intensity of social media use and social competence change over time is influenced by media motivation for self-validation, enhancing the negative long-term relationship.

Susceptibility to Media Effects

In investigating the relation between media use and social competence, it is important to recognise adolescents' differential susceptibility to media effects (Piotrowski & Valkenburg, 2015). Dispositional, developmental, and social factors play a role in the extent to which adolescents experience media effects, either positively or negatively (Piotrowski & Valkenburg, 2015). This corresponds with Rose-Krasnors (1997) view on social competence; in measuring social competence, context and social skills should be accounted for. The paragraphs below discuss one social factor and one dispositional factor to consider when examining the relation between SMU and social competence.

Socioeconomic Status

Hamilton et al. (2022) notice that COVID-19 has had the same affect on all adolescents and their families. They state that "the potential social, psychological, and financial stressors associated with COVID-19, as well as adolescents' access to and use of social media during this time, are largely affected by families' socioeconomic status" (Hamilton et al., 2022, p.670). Socioeconomic status is seen as the combination of financial resources or income, educational level and parent's occupation, which is tied to a subjective

societal norm (APA Dictionary of Psychology, 2023). It has been found that adolescents from families with a lower socioeconomic status experience negative effects from social media more quickly (Hamilton et al., 2022).

In assessing the relation between media use and social competence during COVID-19, it is important to notice that the digital divide enlarged during COVID-19, because of high dependency on technology (Li, 2022). This digital divide, which indicates a difference in opportunity to profit from technology between different societal groups, might have impacted the social competence of adolescents with a lower socioeconomic status (Shah et al., 2020). What impact can be hypothesized here? As previously discussed, it has been found that high intensity SMU has a negative impact on mental well-being (Pandya & Lodha, 2021). Adolescents with a lower socioeconomic status may use social media less intensively due to lower access to technology. It is therefore expected that these adolescents have a lower chance of experiencing negative effects of SMU on social competence change over time.

H3: The relation between intensity of social media use and social competence change is influenced by socioeconomic status, enhancing the negative long-term relationship.

Self-esteem

Self-esteem can be defined as: “an individual’s subjective evaluation of his or her worth as a person.” (Orth & Robins, 2014, p.383). As stated before, individual differences need to be accounted for, when studying media effects (Piotrowski & Valkenburg, 2015). At first glance, self-esteem could be considered a dispositional factor to incorporate as a moderator, as it is an individual characteristic. However, when looking into the concept ‘disposition’, it is seen as a relatively stable character trait, such as a person’s personality type or values (Covey, 2014). Self-esteem may not be considered as such a stable trait, since adolescents’ self-esteem may change daily or even hourly, depending on their experiences

(Valkenburg et al., 2021). So, how and why is it desirable to incorporate this concept as a variable in this study?

Self-esteem has been found to be significantly and positively correlated with social skills (Riggio et al., 1990). These social skills are believed to be an important determining factor in the achievement of social competence (Junge et al., 2020; Rose-Krasnor, 1997). Additionally, a positive correlation directly between self-esteem and social competence was found by Sakiz et al. (2021). Many other studies have found evidence for a mediating role of self-esteem between social media use and various socioemotional concepts, such as loneliness (Lin et al., 2022), life-satisfaction (Chasanah et al., 2020) and depressive tendencies (Ozimek & Bierhoff, 2020). Therefore, it seems both relevant and logical to incorporate self-esteem as a mediator in this study. Valkenburg et al. (2021) stated the following about their exploratory results: “adolescents with a lower mean level of self-esteem, experienced a more positive within-person effect of social media use on self-esteem than adolescents with a higher mean level of self-esteem” (p. 72). This ties into the previously discussed finding that adolescents with lower self-esteem seek out contact via social media (for connection) more, and as a result of this, experience more connection to their peers (Reich, 2017). This heightened sense of self-esteem due to an increased ISMU is thus expected to increase the perceived social competence of adolescents. The following is therefore hypothesized in this study:

H4: Self-esteem will weaken the negative relation between intensity of social media use and social competence change over time.

H4a: There is a positive relation between intensity of social media use and self-esteem.

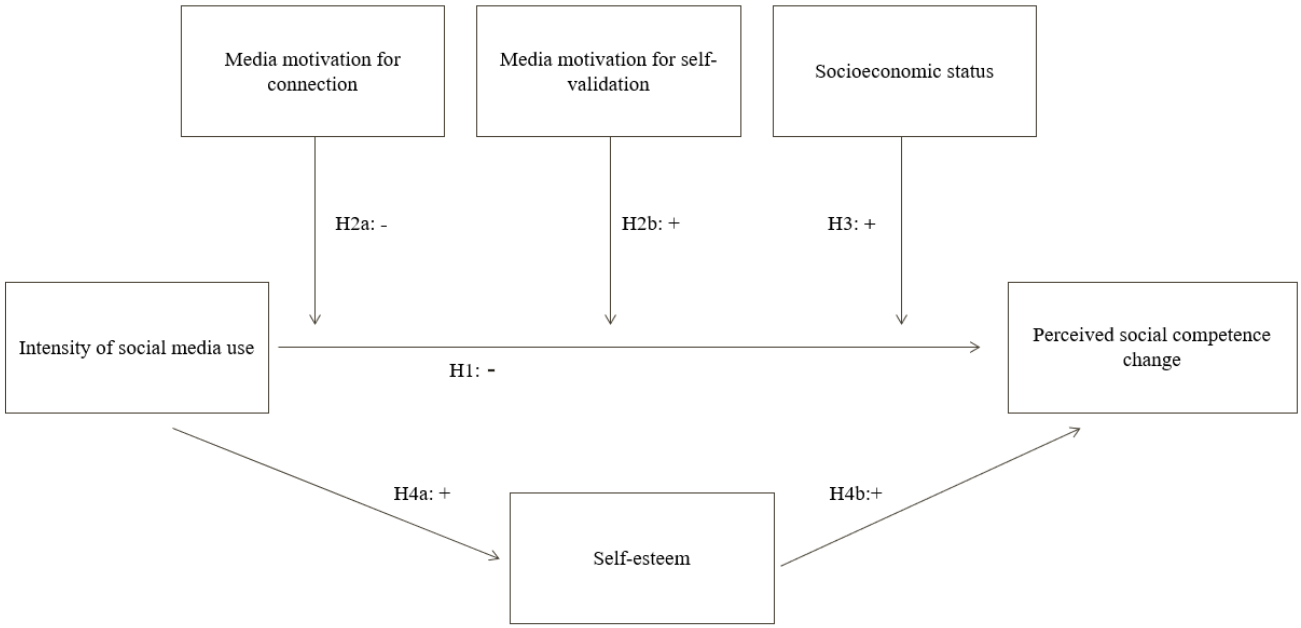
H4b: There is a positive relation between self-esteem and perceived social competence change over time.

Current Study

In sum, this study investigates the following research question: “To what extent does social media use relate to the change of social competence over time during the COVID-19 pandemic and how is this effect moderated by media motivation and socioeconomic status and mediated by self-esteem?”. The hypothesized relations are displayed in Figure 1.

Figure 1

Model of the Examined Relations Between the Incorporated Variables



Method

Disclosures

This study's main hypotheses, methods and analytical plan were preregistered on AsPredicted (https://aspredicted.org/H3K_P61). It needs to be noted that after preregistering, but before data-analysis, the role of self-esteem within the theoretical framework was reconsidered. It was thereby chosen to incorporate self-esteem as a mediator, rather than as a moderator.

Design

For this quantitative research, a longitudinal design was executed to investigate the relationships between the intensity of social media use and changes in social competence over time during the COVID-19 pandemic. The variables Media Motivation and Socioeconomic Status were considered to investigate their possible moderating effects on the relation between Intensity of Social Media Use and Perceived Social Competence Change. The variable Self-esteem was considered to investigate it's possible mediating effect on the relation between Intensity of Social Media Use and Perceived Social Competence Change.

For this research, secondary survey data from The Digital Family project was used. The Digital Family Project was established to study the long-term relationship between digital media use of adolescents, their family context, and addictive digital media behaviours (Utrecht University, 2023). Hereto, a total of four measurement waves were conducted from April 2020 to February 2022, during the COVID-19 pandemic. The Ethics Committee of the Faculty of Social and Behavioural Science at Utrecht University approved the Digital Family study (FETC20–192).

This paper uses data from the second (November and December 2020) and third measurement waves (May until July 2021). These waves were chosen because Self-esteem was not measured in the first wave. Considering the preferred confidence level and margin of error, the second and third waves were chosen over the fourth wave, since these had more participants.

Participants

In total, $N = 390$ adolescents and $N = 414$ parents participated in the second wave. Of these adolescents, 261 participated in the third wave, along with 287 parents. However, of the dataset provided, only 203 adolescent cases provided complete data on both Perceived Social Competence and Intensity of Social Media Use in both waves. Additionally, five cases did not

provide data on family Socioeconomic Status, and can therefore not be used in the main analyses. This sample (N = 198) is smaller compared to that of other longitudinal research of social media effects (Boer et al., 2020; Brandtzæg, 2012). To evaluate the reliability of the statistical analyses, a post-hoc power analysis was conducted using G*power version 3.1.9.7 (Faul et al., 2009). The effect size in this study was set to 0.08, which is considered a small to medium effect size. With a significance of 0.05 and a sample size of 198, the power analysis for the linear multiple regression model with four predictors indicated a power of .90. This indicates that power when incorporating all moderators in one analysis in MEMORE was sufficient. For the results of the post-hoc power analysis, see Appendix A.

Of the adolescent participants, 53.9% was female, age (M = 13.75, SD = 2.14) and 97.6% of adolescents was born in the Netherlands. A total of 18.9% of adolescents were still in primary school. Of the adolescents in secondary education, 12.6% attended lower, 32.4% middle and 55% higher level education. A total of 4.9% adolescents attended secondary vocational education and 1.5% higher professional education. Of the adolescents, 172 were living in a traditional household with two parents (83.5%).

Instrumentation

For the full list of items see Appendix B.

Perceived Social Competence

Perceived Social Competence (PSC) was measured among the adolescents. Hereto, the "Close friendships" subscale of the Harters' Self-Perception Profile of Adolescents by Harter (1988) was used. The subscale was translated to Dutch. All five items were measured using a 5-point Likert scale, ranging from (1) "not true at all" to (5) "completely true". An exemplary item measuring social competence was "I can keep a close friend for a long time". Items 2, 3, 4 and 5 were recoded, so that a higher score represents a higher level of PSC. The overall PSC was measured by adding the answers to all five items, with a higher score indicating a higher

social competence. Internal consistencies at wave two and three were analysed and resulted in a Cronbach's $\alpha = .72$ and a Cronbach's $\alpha = .68$ respectively, which both show acceptable internal consistencies. Since the current study was aimed at investigating the social competence change over time, a separate variable indicating the PSC change was calculated. This was done by subtracting the PSC score from wave two from the PSC score in wave three, with a positive score indicating an increase in social competence over time.

Intensity of Social Media Use

ISMU was measured among the adolescents. Hereto, the five-item scale developed by Van den Eijnden et al. (2018) was used. Three items assessed active ISMU, two of the items assessed passive ISMU. All items were measured using a 7-point Likert scale. For the active ISMU, the measurement ranged from (1) "never/less than once a day/week" to (7) "more than 40 times a day".

The measurement for passive ISMU ranged from (1) "less than once a day" to (7) "more than 80 times a day". Examples of items measuring the two sub-scales of ISMU are "How many times a day do you check social network sites?" (passive) and "How many times a week do you post a message, photo or video on a social network site?" (active). For both items, exemplary social network sites were provided to the participant. The overall ISMU was measured by adding the answers to all five items, with a higher score indicating a higher ISMU. Internal consistencies at wave two and wave three were analysed and resulted in a Cronbach's $\alpha = .74$ and a Cronbach's $\alpha = .77$ respectively, which both show acceptable internal consistencies.

Media Motivation

Media Motivation (MMOT) was measured among the adolescents. Items of the original 13-item scale were derived from Horzum (2016) and Hew (2011). The scale consists of six subscales, based on research by Rodgers et al. (2021) and Horzum (2016), each

measuring a different type of media motivation: educational and informational, self-validation, connection, entertainment, escapism and self-expression. Since the current study focused on the moderating role of media motivation for self-validation (MOTsv) and connection (MOTcon), only item 3, 4, (MOTsv) and 8, 9 and 11 (MOTcon) were incorporated in the analyses. All items were measured using a 5-point Likert scale, ranging from (1) "never"; to (5) "very often". Examples of items measuring the two sub-scales of MMOT are "In the past two weeks, how often did you use social media to be seen by others?" (MOTsv) and "In the past two weeks, how often did you use social media to stay in touch with friends?" (MOTcon). For both items, exemplary social network sites were provided to the participant. The total MMOT for each sub-scale was measured by adding the scores from the corresponding items, with a higher score indicating a higher media motivation. Internal consistencies at wave two and wave three were analysed for both subscales and resulted in a Cronbach's $\alpha = .68$ and a Cronbach's $\alpha = .76$ respectively for MOTsv, which show acceptable internal consistencies. For MOTcon, the consistency analysis resulted in a Cronbach's $\alpha = .52$ for wave two and a Cronbach's $\alpha = .59$ for wave three, which are considered poor, but not unacceptable internal consistencies. However, this means that the results regarding this subscale should be interpreted with caution.

Socioeconomic Status

Socioeconomic Status (SES) was measured among the parents. Hereto, the Family Affluence Scale by Boyce et al. (2006) was used. The scale comprised of four items, measuring car ownership (none, one, two or more), children having a private bedroom (yes or no), amount of holidays in the past year (none, one, two, two or more) and the number of computers, laptops and tablets in the home (none, one, two, three, four, more than four). The mean score of both parents was used when available. Since this scale is a formative scale with independent items, internal consistency was not assessed (Geurts et al., 2022).

Self-esteem

Self-esteem (SE) was measured among the adolescents. Hereto, five items of the Rosenberg self-esteem scale by Rosenberg (1965) were used and translated to Dutch. All items were measured using a 5-point Likert scale, ranging from (1) “not true at all” to (5) “completely true”. An exemplary item measuring SE was “I take a positive attitude towards myself”. Item 4 was recoded so that for all items, a higher score represents a higher level of self-esteem. The overall SE was measured by adding the answers to all five items, with a higher score indicating a higher SE. At wave two and three, internal consistency was analysed and resulted in a Cronbach’s $\alpha = .86$ and a Cronbach’s $\alpha = .90$ respectively which show good internal consistencies.

Procedure

Participants were solicited through advertisement, schools, sports clubs and flyers. Families participated with a minimum of one and a maximum of two parents or caregivers, and a minimum of one and a maximum of two children. Each wave, a digital questionnaire taking up 30 to 45 minutes was filled in independently of the other family members. Before filling in the questionnaires both adolescents and parents signed an informed consent at the beginning of the questionnaire. Additionally, parental informed consent was collected. Each member of the family participating received a gift card worth five euros as compensation for their participation.

Data Analysis

First, descriptive statistics of the key variables and participants were checked. Additionally, a Spearman’s correlation analysis was conducted to test for relationships between ISMU, PSC, MOTcon, MOTsv, SE and SES. Gender and age were included as control variables.

Secondly, a regression-based MEMORE-analyses (Montoya, 2019) was conducted to investigate the influence of the moderators, MOTcon, MOTsv and SES on the relationship between ISMU (predictor) and PSC change (outcome variable). The multiplicative moderation model (number 3) was used (Montoya, 2019). Following, a regression-based PROCESS-analysis (Hayes, 2012), was conducted to investigate the influence of the mediator self-esteem on the relation between ISMU and PSC change (model 4). All analyses were conducted using SPSS 29.

Results

Preliminary Results

First, it was investigated whether Cronbach's alpha of MOTcon could be improved by deleting items. However, Cronbach's alpha was indicated to decrease when deleting any of the three items. All items were therefore maintained in the dataset. Descriptive statistics of all variables included in the main analyses are presented in Table 1.

Before conducting the correlation analysis, the assumptions of normality, linearity and homoscedasticity were checked. Except for ISMU, all other variables showed a significant Shapiro-Wilk *(W),* thereby violating the assumption of normality. The assumption of linearity was not violated, since the plotted relations between the dependent and independent variables appeared to be linear. The assumption of homoscedasticity was not violated, since all independent variables seemed to have roughly the same amount of variability of scores at all levels of difference in PSC change. Because normality was violated, it was chosen to conduct a Spearman's Rho instead of a Pearson's r to check for correlation. Several significant bivariate correlations were found (see Table 2.).

For both the MEMORE analysis as the PROCESS analysis, the assumptions of a regression need to be checked. Therefore, the assumptions normality and multicollinearity of

the variables and linearity, normality, homoscedasticity of residuals and the presence of outliers were checked.

Table 1

Descriptive statistics for all study variables

Variable	*n (%)*	*M(SD)*	*Range*
1. Gender (boys)	95 (46.1%)	-	-
2. Age	206	13.75 (2.14)	10-18
3. PSCW2	206	2.57 (.67)	1.60-4.60
4. PSCW3	206	2.60 (.68)	1.60-5.00
5. PSCchange	206	0.03 (.79)	-2.60-2.40
6. ISMU	203	3.24 (1.14)	1.00-6.60
8. MOTcon	206	1.97 (1.12)	1.00-5.00
7. MOTsv	206	2.80 (.83)	1.00-4.67
10. SES	201	2.89 (.48)	1.60-3.75
9. SE	206	3.58 (.52)	1.80-5.00

Note. PSCW2 = Perceived Social Competence Wave 2; PSCW3 = Perceived Social Competence Wave 3; PSCchange = Perceived Social Competence Change; ISMU = Intensity of Social Media Use; MOTsv = Media Motivation for Self Validation; MOTcon = Media Motivation for Connection; SES= Socioeconomic Status; SE = Self-esteem.

As stated before, the assumption of normality was violated. The assumption of multicollinearity was not violated, since all predictor variables had a tolerance > 0.2 and a VIF < 5.0. By inspecting the normal probability plot of standardised residuals as well as the

scatterplot of standardised residuals against standardised predicted values, it was found that the assumptions of normality, linearity and homoscedasticity of residuals were not violated. No outliers were deleted from the dataset, since no cases carried a Cook's distance > 1.00. Results from the assumptions check can be found in Appendix C.

Table 2

Correlations for all study variables

Variable	1	2	3	4	5	6	7	8
1. Gender	-							
2. Age	.17*	-						
3. PSCchange	-.04	-.12	-					
4. ISMU	.17*	.29**	-.04	-				
5. MOTcon	.25**	.11	-.02	.53**	-			
6. MOTsv	.11	.25**	-.09	.47**	.50**	-		
7. SES	-.04	.17*	-.03	.16*	.01	.14	-	
8. SE	-.15*	-.08	.18*	-.09	-.09	-.06	.00	-

Note. For the variable Gender, boys were coded 1 and girls were coded 2.

$^{*}p < .05$. $^{**}p < .01$

The variables dependent on open-ended questions were plotted and inspected for outliers. One outlier was found. This person indicated to have an improbable amount of younger brothers and sisters given their age. However, since they have fully filled in the questionnaire and have not finished the questionnaire in an improbable amount of time to do so carefully, their data will be incorporated in the analyses. Since the sample size of this study

is substantial, it was chosen to continue with the analysis as normal, without transforming variables to meet the assumption of normality.

Hypothesis Testing

To test hypotheses and check directions of relationships found in correlations, MEMORE model 3 was used with ISMU as a predictor, PSCW2 and PSCW3 as the outcome variables (MEMORE calculates the difference over time automatically) and MOTsv, MOTcon and SES as moderators. The confidence interval was set at 95%. Additionally, the PROCESS Macro model 4 with ISMU as a predictor, PSCchange as an outcome variable and SE as a mediator was used. The confidence interval was set at 95% and 5000 bootstrapping samples were added to test the indirect effects.

H1. Effect of ISMU on PSCchange

First, it was tested whether there was a significant change over time in Perceived Social Competence. The results of the MEMORE analysis show no significant change between PSCW2 and PSCW3, b = 13.24, SE =8.61, t (182) = 1.54, p = .126, CI [-3.74, 30.23]. This means PSC did not significantly change between wave 2 and wave 3.

Second, H1 expected that Intensity of Social Media Use would have a negative relation with PSC change over time. The results showed no significant direct effect between ISMU and PSC change over time, b = -4.14, SE =2.86, t (182)= -1.45, p = .150, CI [-9.79, 1.51]. This means ISMU does not have a significant relation with PSC change over time.

H2a. Effect of ISMU on PSCchange Moderated by MOTcon

Hypothesis H2a expected a negative moderation effect of Media Motivation for Connection on the relationship between ISMU and PSCchange. Results indicated no significant interaction effect, b = 1.36, SE =0.98, t (182) = 1.39, p = .167, CI [-0.57, 3.29]. This means that MOTcon does not moderate the relationship between SMU and PSC change over time.

H2b. Effect of ISMU on PSCchange Moderated by MOTsv

Hypothesis H2b expected a positive moderation effect of Media motivation for self-validation on the relationship between ISMU and PSCchange. Results indicated no significant interaction effect, b = 3.02, SE =1.61, t (182)= 1.88, p = .062, CI [-0.16, 6.19]. This means that MOTsv does not moderate the relationship between SMU and PSC change over time.

H3. Effect of ISMU on PSCchange Moderated by SES

Hypothesis H3 expected a positive moderation effect of Socioeconomic Status on the relationship between ISMU and PSCchange. Results indicated no significant interaction effect, b = 1.50, SE =0.98, t (182) = 1.53, p = .127, CI [-0.43, 3.44]. This means that SES does not moderate the relationship between SMU and PSC change over time.

H4. Effect of ISMU on PSCchange Mediated by SE

Hypothesis H4 expected a mediating effect of Self-esteem on the relation between ISMU and PSCchange. Hereto, first the relation between ISMU and SE was investigated (H4a). The relation between ISMU and SE was found to be insignificant, b = -0.03, SE =0.03, t = -0.81, p = .419, CI [-0.09, 0.04]. This means that ISMU is not a predictor of SE.

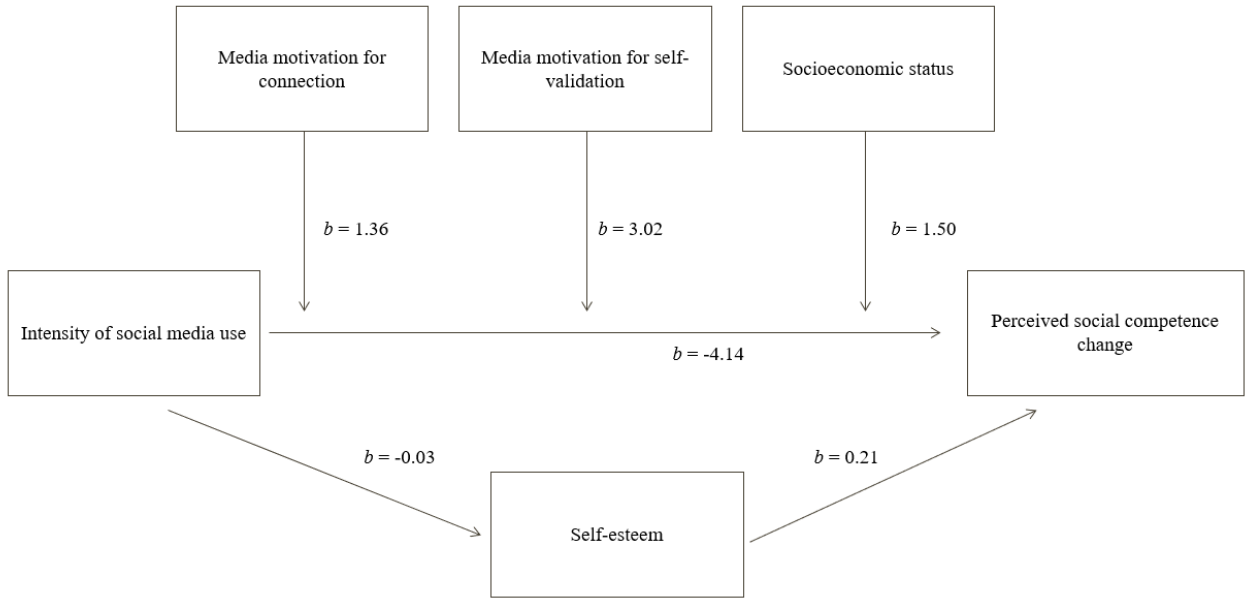
Secondly, the relationship between SE and PSCchange was tested (H4b). This relationship was found to be not significant, b = 0.21, SE =0.11, t = 1.96, p = .051, CI [0.00, 0.42].

Lastly, the mediating effect of SE on the relation between ISMU and PSC was tested (H4). No mediating effect was found, as the confidence intervals are not in the same direction, b = -0.01, CI [-0.02, 0.01]. This means that SE does not mediate the relationship between ISMU and PSC change over time.

The results of the main analyses are presented in Figure 2.

Figure 2

Results of the moderation and mediation analyses.



Note. b = unstandardized regression coefficient.

Discussion

Considering the essential role of social competence for social learning and academic advancement, this study examined the relationship between the intensity of social media use and social competence change during the COVID-19 pandemic and considered media motivation and socioeconomic status as moderators and self-esteem as a mediator of this relationship. The results of this study showed that there was no significant relation between intensity of social media use and social competence change over time (H1). The moderating and mediating relations examined were found to be insignificant as well. However, several significant correlations were found, which provide directions for future research.

Perceived Social Competence Change

Perceived Social Competence Change was the dependent variable for all analyses executed. However, no significant change in social competence was found, possibly explaining the insignificant findings of the further analyses.

A possible explanation for the insignificant change in perceived social competence can be found in the experience of connectedness. Positive online experiences has been found to diminish the experience of loneliness during COVD-19 (Marciano et al., 2022). As stated before, adolescents are in a developmental phase where they highly depend on peer relations (Branje & Morris, 2021; Hamilton et al., 2022). Social media use might have fulfilled the dire need to experience connectedness with peers in times of isolation, possibly increasing their experience of social competence.

However, social media use has often been linked to lower social skills (Cockerham et al., 2021) or lesser development of social skills (Steinsbekk et al., 2024). Additionally, when looking at the context of this study, peer conflict and other social stressors were difficult to avoid during the pandemic, due to the reliance on social media for connection (Hamilton et al., 2022). Increased social media use, combined with increased experience of peer conflict may have impacted the perceived social competence of adolescents negatively. These negative effects of increased social media use might have cancelled out the positive effects of social media use during the pandemic, explaining the insignificant change in perceived social competence change over time.

The finding of no significant change in the perceived social competence of adolescents during COVID-19, could be a positive finding. This possibly indicates that adolescents' perceived social competence was not affected by the increased dependence on social media use during COVID-19, causing little harm to the ability of adolescents to learn through social

or intercultural learning and to adolescents' academic advancement (Junge et al., 2020; Seeber & Wittmann, 2017).

Hypothesis 1

A possible explanation for the lack of a significant relation between intensity of social media use and social competence change over time can be found in Hamilton et al. (2022); they state that in order to assess social media's influence on adolescent's socioemotional development, one needs to focus on the different uses of social media. This study focused mainly on the amount of social media use, but not on the different platforms and actions of the adolescents on these platforms. Adolescent's online actions might however severely impact the socioemotional consequences of social media use. For example, Selfhout et al. (2009), found different effects of social media use when instant messaging versus surfing online on the mental well-being of adolescents. Escobar-Viera et al. (2018) also found that active versus passive social media use have a different relation to adolescent's depressive symptoms. A limitation of this study is therefore that the different uses of social media were insufficiently accounted for in the research design. By looking at the amount of social media use, without differentiating between different uses of social media, both positive and negative effects of those different media uses for social competence might have annulled each other. The measure of intensity of social media use in the survey of this study did contain two subscales, measuring both active and passive social media use. If this study would have differentiated between these two types of social media use, different results could have been found.

Another possible explanation for the lack of significance in the relation between social media use and perceived social competence change lies in the concept of agency. Boer et al. (2021) state that the amount of social media use in itself does not lead to negative mental-health problems for adolescents, but rather the inability to control one's social media use. So,

when adolescents are not able to control their impulses in regards to social media, by for example having strong negative emotions when they are not able to use social media, negative effects on adolescent's mental health seem to be elicited (Boer et al., 2021). A limitation of this study is therefore that the difference in agency of adolescents over their social media use was not accounted for in the research design.

Hypothesis 2a

One way in which this study did aim to differentiate between different uses of social media, was by investigating media motivation as a moderator. This study found no significant moderating effect of media motivation for connection on the relation between intensity of social media use and social competence change over time, contrary to both the social compensation theory (Reich, 2017; Selfhout et al., 2009) and the rich-get-richer theory (Desjarlais & Willoughby, 2010; Reich, 2017). However, the reliability of this finding is limited due to a low Cronbach's alpha of the subscale reflecting media motivation for connection, indicating that careful consideration is necessary when interpreting the results.

Cronbach's alpha would not increase when deleting any of the items. This could be explained by the fact that Cronbach's alpha is affected by the number of items measuring a concept (Tavakol & Dennick, 2011). However, when looking into the content of the questions of the MOTcon subscale, it seems that two questions reflect the motivation to use media to stay in touch with friends/the world, and one question is aimed at the interest to use social media to make new friends. It can be argued that these motivations require different efforts from adolescents. As previously discussed, there is a difference between passive and active social media use. When looking at these items, the item regarding making new friends, seems to require an active effort of the adolescent, whilst the other two items could be fulfilled in a more passive way. This again relates to the finding of Selfhout et al. (2009), who found different effects of social media use when instant messaging (active social media use) versus

surfing online (passive social media use) on the mental well-being of adolescents. Additionally, it has been found that individuals prefer to invest time in existing friendships over investing that same time to create three to four new friendships, possibly due to the need for a sense of belonging (Hall, 2019). This motivation to maintain or develop existing friendships thus can be seen as more important to individuals compared to the motivation to develop new friendships. Perhaps, the context of COVID-19 could have made it even more important for adolescents to stay in touch with existing friends than to make new friends. So, the motivation and efforts required of adolescents inherent to the items within the subscale of media motivation for connection seem to differ, possibly causing internal inconsistency of the measure of media motivation for connection.

Hypothesis 2b

Contrary to the social comparison theory (Vogel et al., 2014; Yang, 2016), no significant moderating role of media motivation for self-validation on the relation between intensity of social media use and social competence change over time was found. An explanation for this can be found in the possible positive effects of using social media for self-validation. People use social media to experiment with different presentations of themselves and seek approval of others on this, through comments and likes (Islam et al., 2020). Even though this can lead to upwards comparison, resulting in a more negative self-image and detrimental effects on mental-health (Hamilton et al., 2022; Islam et al., 2020; Yang, 2016), adolescents can also receive positive peer-feedback through likes and comments, leading to social rewards and reassurance of self-image (Hamilton et al., 2022; Nesi et al., 2021). Since this study focused mainly on the upwards-comparison side of the motivation for self-validation, possible positive effects caused by positive peer-feedback were not taken into consideration. Additionally, the context of the COVID-19 pandemic must not be disregarded. Since social media was one of the only locations to have interaction with peers, it is possible

that social media was the only place for vulnerable adolescents to experience social support (Hamilton et al., 2022). It is therefore possible that the adolescents in this study also experienced positive effects of using social media with the motivation for self-validation, causing their perceived self-competence not to be harmed by their social media use.

Hypothesis 3

No significant moderating effect of socioeconomic status on the relation between intensity of social media use and social competence change over time was found. The negative moderating effect that was expected, was based on the logic that less exposure to social media due to the increased digital divide during COVID-19, would result in less risk to experience negative effects from social media use. Two points of critique can be made on this approach. Firstly, as stated in the introduction, adolescents with a lower socioeconomic status have been found to be more susceptible to negative social media effects (Hamilton et al., 2022). In the theoretical framework it was not recognized that these adolescents with a lower socioeconomic status may have experienced more COVID-related social stressors, whilst being almost fully dependent on social media to experience social connections (Hamilton et al., 2022). So therefore, even though their access to social media might have been limited, a lot of pressure was put on the social media use of these adolescents with a lower socioeconomic status, which might have had detrimental effects for their socioemotional well-being. Secondly, socioeconomic status encompasses more than wealth, as previously discussed. The items used in this study to measure family socioeconomic status all focus on direct indicators of wealth, but not on educational level or parent's occupation. This could have created a limited insight into the actual socioeconomic status of participants. Had these factors also been accounted for in the measure, possibly different results would have been provided.

Hypothesis 4

Even though, similar to findings of previous studies, a significant correlation was found between self-esteem and social competence change, no significant mediating effect of self-esteem on the relation between intensity of social media use and social competence change over time was found. This contrasts the anticipated effects based on the finding of Valkenburg et al. (2021) of significant difference in experienced social competence between adolescents with low-self-esteem and higher levels of self-esteem as a result of social media use. A possible explanation for the lack of mediation by self-esteem could be that the level of adolescents' self-esteem as a result of social media use has been found to fluctuate heavily, relying on the social media content perceived (Cingel et al., 2022). This ties into the previously discussed finding that self-esteem is able to differ on a day-to-day or even hourly base (Valkenburg et al., 2021). This raises questions about the measurement of this construct in this study. As data on self-esteem from one measurement wave was incorporated in the analysis, it can be argued that the self-esteem level measured might not have been an accurate representation of the average self-esteem level of the adolescent. However, other studies with a similar design (Chasanah et al., 2020; Lin et al., 2022) did find self-esteem to be a significant mediator between social media use and various socioemotional concepts. It would therefore be interesting to investigate the measure of self-esteem further in longitudinal or diary study designs on media effects to acknowledge changes over time.

Implications

This research provides implications for research on social media use and learning processes. No significant PSC change was found between different measurement waves, indicating that social media use might not hamper perceived social competence and thereby social learning ability. Earlier studies on the effect of social media on learning outcomes often stress the hampering effects (Rithika & Selvaraj, 2013). Even though this study did not

investigate the direct relation between social media use and affordances for social learning and learning outcomes, the findings of this research indicate that perhaps positive affordances of social media, such as the ability to experiment with self-presentation and receiving positive peer feedback should be considered when investigating social media's effect on social learning outcomes.

Additionally, the results of this study provide practical implications for media literacy initiatives, such as the JEDi project. A goal of such projects is to create consciousness about different factors, such as motivations and environmental support, that make adolescents more susceptible to media effects (Jeugd en Digitalisering, 2024). This study found a significant correlation between gender and media motivation for self-validation; media motivation for self-validation was significantly higher for girls. Additionally, a positive correlation between age and media motivation for connection was found; media motivation for connection was higher for older adolescents. These correlations could be helpful for media literacy initiatives when designing and implementing interventions for harmful social media use.

Limitations and Future Directions

This study was limited by the sole focus on intensity social media use and the lack of differentiation between passive and active social media use. Suggestion for further research, related to these limitations, are to investigate the role of passive versus active social media use on the perceived self-competence of adolescents. This way, the underlying mechanisms that affect adolescent's social competence, such as the active search for connection versus passive social comparison can be distinguished (Verduyn et al., 2022). Additionally, in line with the research of Petropoulos Petalas et al. (2021), future studies should aim to include multiple measurements of social media use, to grasp the effects of social media use on the socioemotional well-being of adolescents more completely.

Due to inconsistency in the measurement of motivation for connection and incomplete measurement of socioeconomic status, the measures of this study possibly did not always reflect the intended concepts accurately, causing limitations for this study. Future research on media susceptibility can learn from these limitations by carefully analysing whether their items accurately reflect the constructs measured, and adapting accordingly.

Lastly, the design of this study did not account for the fluctuating nature of self-esteem. Future research could consider a different design to study the mediating effect of self-esteem, by for example including diary measures (Cingel et al., 2022). Then, distinction could be made between short-term and long-term effects of self-esteem on socioemotional development.

Conclusion

This research investigated the relationship between the intensity of social media use and perceived social competence change over time during the COVID-19 pandemic. Additionally, the moderation effects of media motivation and socioeconomic status and the mediating effect of self-esteem were investigated. The insignificant findings of this research possibly indicate that adolescents' social competence was not negatively affected by the high dependence on social media during COVID-19. Along with the implications for educational research, this study also provided insight into significant relationships that can be used to help media literacy initiatives identify factors that contribute to the susceptibility of individuals to media effects. To conclude, the effects of the underlying processes of active versus passive social media use and the precarious nature of self-esteem stresses the need for further research with different measurements for social media use and different study designs.

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APPENDIX A

In- and Output Post-hoc Power Analysis

The test family "F tests" was chosen. For the statistical test, the following option was chosen: Linear multiple regression: Fixed model, R^2 deviation from zero. Post-hoc was chosen for the type of power analysis. In the table below, the further in-and output in G*Power can be seen.

Table A1

In-and output post-hoc power analysis

Parameter category	*Option*	*Numeral in- or output*
Input	Effect size f^2	.08
	α err prob	.05
	Total sample size	198
	Number of predictors	4
Output	Noncentrality parameter λ	15.84
	Critical F	2.42
	Numerator df	4
	Denominator df	193
	Power (1-β err prob)	.90

APPENDIX B

Table B1

Items used for the analysis of all incorporated variables

Scale	Item number	Full items
Age	1	What is your date of birth?
Gender	2	Are you a boy or a girl?
ISMU	AV17	How many times a day do you check social network sites (for example, Instagram, Facebook, YouTube, Pinterest, Discord or Twitter)?
	AV18	How many times a week do you post a message, photo, or video on social network sites (for example, lnstagram, Facebook, YouTube, Pinterest, Discord or Twitter)?
	AV19	How many times a week do you 'like' messages, photos, or videos from others on social network sites (for example, lnstagram, Facebook, YouTube, Pinterest, Discord or Twitter)?
	AV20	How many times a day do you check your smartphone on messages, photo's, or videos, via for example WhatsApp, Snapchat or chat?
	AV21	How many times a day do you send a message, photo or video via your smartphone, via for example Whatsapp, Snapchat, chat?
PSC	1	I can keep a close friendship for a long time.
	2	I do not have a close friend with whom I can share a secret.
	3	I do not have a close friend to do things with.
	4	I find it hard to get friends on whom I can count.

Scale	Item number	Full items
	5	I do not have a friend with whom I can share personal thoughts.
MOTcon	8	In the past two weeks, how often did you use social media (for example, WhatsApp, Snapchat, TikTok, YouTube, Instagram, Facebook, Pinterest, Twitter, blogs and forums etc.) to not be cut off from the world?
	9	In the past two weeks, how often did you use social media (for example, WhatsApp, Snapchat, TikTok, YouTube, Instagram, Facebook, Pinterest, Twitter, blogs and forums etc.) to stay in touch with friends?
	11	In the past two weeks, how often did you use social media (for example, WhatsApp, Snapchat, TikTok, YouTube, Instagram, Facebook, Pinterest, Twitter, blogs and forums etc.) to make new friends?
MOTsv	3	In the past two weeks, how often did you use social media (for example, WhatsApp, Snapchat, TikTok, YouTube, Instagram, Facebook, Pinterest, Twitter, blogs and forums etc.) to see if others liked your post?
	4	In the past two weeks, how often did you use social media (for example, WhatsApp, Snapchat, TikTok, YouTube, Instagram, Facebook, Pinterest, Twitter, blogs and forums etc.) to be seen by others?
SES	1	Does your family own a car/van?
	2	Do your children have their own bedroom?
	3	How many times have you been on a holiday in the past year?
	4	How many computers/tablets/laptops do you have at home?

Scale	Item number	Full items
SE	1	I feel that I am a person of worth, at least as much as others.
	2	I take a positive attitude toward myself.
	3	I am able to do things as well as most other adolescents.
	4	I feel I do not have much to be proud of.
	5	I feel that I have a number of good qualities.

Note: Definitions of the measures are the following: ISMU = Intensity of Social Media Use; PSC = Perceived Social Competence; MOTcon = Media Motivation for Connection; MOTsv = Media Motivation for Self Validation; SES= Socioeconomic Status; SE = Self-esteem.

APPENDIX C

Table C1

Assumptions results on Normality and Multicollinearity

Variable	*Shapiro-Wilk*			*Tolerance*	*VIF*
	Statistic	*df*	*p*		
1. PSCchange	.98	198	.013	-	-
2. ISMU	.99	198	.103	.62	1.61
3. MOTcon	.82	198	<.001	.65	1.53
4. MOTsv	.97	198	<.001	.71	1.41
5. SES	.94	198	<.001	.95	1.05
6. SE	.96	198	<.001	.99	1.01

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Statement on the Use of Generative AI.

For this study, ChatGPT was used in the data-preparation to generate the Excel-code to match the unique adstring numbers to the family id numbers. For this, the following two prompts were used: "In Excel, I want to know whether a value also exists in another row. How can I write the compare code?" and "Can you give me the code for Dutch Excel?". The generated code was then pasted in Excel to identify the family id numbers with no corresponding adolescent id. This information was then used to filter out these cases of the dataset. Besides this instance, no further use was made of AI to generate texts