



HAL
open science

Self-esteem in male and female college students: Does childhood/adolescence background matter more than young-adulthood conditions?

Julie Arsandaux, Emilie Boujut, Reda Salamon, Christophe Tzourio, Cedric Galera

► **To cite this version:**

Julie Arsandaux, Emilie Boujut, Reda Salamon, Christophe Tzourio, Cedric Galera. Self-esteem in male and female college students: Does childhood/adolescence background matter more than young-adulthood conditions?. *Personality and Individual Differences*, 2023, 206, <10.1016/j.paid.2023.112117>. <hal-04028659>

HAL Id: hal-04028659

<https://hal.science/hal-04028659v1>

Submitted on 31 Mar 2025

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons CC BY-NC 4.0 - Attribution - Non-commercial use - International License

Self-esteem in male and female college students: does childhood/adolescence background matter more than young- adulthood conditions?

Julie Arsandaux, PhD^{*a,d}, Emilie Boujut, Ph.D^b, Réda Salamon, PhD^a, Christophe Tzourio,
M.D, PhD^a and Cédric Galéra, M.D, Ph.D^{a,c}

^a Univ. Bordeaux, Inserm, Bordeaux Population Health Research Center, team HEALTHY,
UMR 1219, F-33000 Bordeaux, France.

^b Université de Paris, Laboratoire de Psychopathologie et Processus de Santé, F-92100
Boulogne Billancourt, France

^c Centre Hospitalier Perrens, Bordeaux, France.

^d Nantes Université, Univ Angers, Laboratoire de psychologie des Pays de la Loire, LPPL,
UR 4638, F-44000 Nantes, France

Corresponding Author: Julie Arsandaux

Postal address:

Nantes université, LPPL

Chemin de la Censive du Tertre - BP 81227

44312 Nantes Cedex 3

Tel: +33 (0) 02-53-52-26-81

E-mail: julie.arsandaux@univ-nantes.fr

FUNDING

Funding The i-Share team are currently supported by an unrestricted grant of the Nouvelle-Aquitaine Regional Council (Conseil Régional Nouvelle-Aquitaine, grant N° 4370420). It has also received grants from the Nouvelle-Aquitaine Regional Health Agency (Agence Régionale de Santé Nouvelle-Aquitaine, grant N°6066R-8 R-8), Public Health France (Santé Publique France, grant N°19DPPP023-0) and The National Institute against cancer INCa (grant N°INCa_11502).

ETHICAL STANDARDS

Ethics approval and consent to participate: The i-Share project was approved by the “Commission nationale de l’informatique et des libertés” (National Commission of Informatics and Liberties, Reference DR-2013-019). Students were informed on the nature and purpose of the study and provided on-line consent.

CONFLICTS OF INTEREST

None declared

ACKNOWLEDGEMENTS

The authors are indebted to the participants of the i-Share project for their commitment and cooperation and to the entire i-Share staff for their expert contribution and assistance.

1 **ABSTRACT (n=194)**

2 The aim of the present study was to investigate self-esteem associated factors related to
3 childhood/adolescence or young-adulthood in male and female college students. Based on the i-Share
4 cohort, childhood/adolescence and young-adulthood related factors were collected at study enrolment.
5 Three months later, global self-esteem was evaluated through the Rosenberg Self-esteem Scale. Linear
6 regression models were performed for the different time period factors (childhood/adolescence factors,
7 young-adulthood factors) and R-squared were computed for each model. Among the 6602 college
8 students included, 78.8% were female with a mean age of 20.7 (SD=2.2) and mean self-esteem score
9 of 27.6 (SD=5.7) for females and 30.3 (SD=5.7) for males. Low self-esteem was associated with
10 factors related to childhood/adolescence (weak parental support, life events, parents with depression or
11 anxiety problems) and young adulthood (freshmen year, high BMI, dissatisfaction with social life, not
12 practicing sports or extra-university activities). Factors related to young adulthood seem to explain
13 more variability among males than factors related to childhood/adolescence (9% versus 5%), whereas
14 the opposite was observed for females (5% versus 7%). Interventions targeting self-esteem should
15 address several factors that consider period of life and gender to intervene efficiently (during
16 childhood/adolescence for females and young-adulthood for males).

17 **Keywords:** Self-esteem; Students; Risk Factors; Gender Characteristics; Developmental Psychology

18

19

20

21

22

23

24

25

26 HIGHLIGHTS

- 27 • College years' self-esteem was explained by factors related to childhood/adolescence and
28 young adulthood independently from mental health conditions
- 29 • Childhood/adolescence factors tended to explain more variability in females whereas young-
30 adulthood factors tended to explain more variability in males
- 31 • Larger effects of parental support and economic situation during childhood were found for
32 female self-esteem compared to male
- 33 • Larger effects of sports practice and satisfaction with social life during young adulthood were
34 found for male self-esteem compared to female
- 35 • Differences in gender and period of life should guide interventional research to promote self-
36 esteem among college students

37 INTRODUCTION

38 Self-esteem development

39 Childhood corresponds classically to the period before age 10, adolescence between 10-19 and young adulthood
40 between 19-25 (Sacks et al., 2003). According to Harter (Harter, 2006), self-esteem emerges in childhood when
41 self-perception is influenced by social interactions. Thereafter, two processes guide the development of self-
42 esteem: the level of cognitive development and socialization. Regarding adulthood, two main theories
43 conceptualize the development of self-esteem: “the neo-socioanalytic theory” and “the social investment
44 principle” (Specht et al., 2014). For the former, self-esteem is thought to evolve towards more mature traits, like
45 other personality traits (e.g. emotional stability, conscientiousness). For the latter, the theory posits that an
46 individual has a fundamental need to belong to a group and that self-esteem may thus be seen as a way to
47 monitor social acceptance or rejection. In addition to these theoretical works, numerous empirical studies
48 described the natural change of global level of self-esteem with an increase in childhood, a stability from 11 to
49 15 years of age and then an increase until the age of 30 (Orth et al., 2018). The framework used in this present
50 study relied more on the state part of self-esteem (based on the social investment principle) (Brent Donnellan et
51 al., 2012).

52

53 **Determinants of self-esteem**

54 Besides this natural evolution, there are also interindividual differences (Birkeland et al., 2012). For
55 instance, men present typically higher self-esteem than women (Bleidorn et al., 2016; Twenge & Campbell,
56 2001). Self-esteem has been found to be associated with parental depression (Garber & Flynn, 2001), socio-
57 economic status (Huurre et al., 2003), familial structure (Gorrese & Ruggieri, 2013), attachment (Krauss et al.,
58 2020) and maltreatment (Mwakanyamale et al., 2018). Concerning college years, social exclusion (Luo et al.,
59 2021), inadequate physical activity (Shang et al., 2021) and body image dissatisfaction (Lowery et al., 2005)
60 were associated with lower self-esteem. However, other factors need further investigation (i.e. sexual
61 intercourses, education level and health domain courses). Furthermore, maltreatment during childhood was
62 associated with lower self-esteem during young-adulthood (Wu et al., 2021), demonstrating that childhood
63 conditions may have a long-term effect.

64 **Present study**

65 While several theoretical and empirical studies have attempted to describe the development of self-
66 esteem and its determinants across adolescence and adulthood, the etiology of self-esteem during young
67 adulthood and specifically during college years remains elusive. Studies among young adults and college
68 students did not include large samples and they investigated a limited number of determinants. In the present
69 study of a large cohort of college students, we investigated a wide range of determinants (e.g. economic, social,
70 psychological) related to different periods of life (from childhood to young adulthood). Indeed, how childhood
71 and adolescence experiences leave their marks on the adult individual remain poorly understood. We
72 hypothesized that childhood-related factors are associated with self-esteem later in life (i.e. during college years)
73 and that several factors of college life are also associated with college self-esteem. We postulated that several
74 factors related to childhood have an independent effect on self-esteem, whatever the situation during college,
75 while others are no longer associated when proximal factors are taken into account. Finally, since males and
76 females present different levels of self-esteem, we were interested in comparing self-esteem etiology across
77 gender.

78 The aim of the current study was to investigate self-esteem's associated factors, to estimate the
79 importance of factors related to childhood/adolescence compared to those specific to young adulthood in a large
80 sample of French college students. The secondary objective was to investigate gender differences.

81

82 **METHODS**

83 **Participant**

84 This study was based on the internet-based Students Health Research Enterprise (i-Share, [www.i-](http://www.i-share.fr)
85 [share.fr](http://www.i-share.fr)) project, one of the largest epidemiological studies conducted on European students. The objective of i-
86 Share is to evaluate important health aspects of university students in France. College students were recruited
87 between 2013 and 2020. The eligibility criteria were to be a university student in France; understand and write
88 French; and at least 18. After baseline questionnaire students received an e-mail invitation to complete follow-up
89 questionnaires annually. From 2016, a mental health survey has been proposed to participants around three
90 months after their enrolment.

91 For the current study, we used the data available as of September 2019 including only participants less
92 than 30 and participating in the mental health survey. Of the 15466 eligible students enrolled in the i-Share
93 cohort, 6602 were analyzed for primary analysis (Figure 1). Study sample was composed mainly by females
94 (78.8%) with a mean age of 20.7 (standard deviation (SD)=2.2).

95

96 **Measures and scales**

97 Global self-esteem level was assessed using the Rosenberg Self-Esteem Scale (Rosenberg, 1989), the
98 most widely used instrument (Blascovich & Tomaka, 2013). It has been validated into French (Chambon et al.,
99 1992), and provide good consistency (Similar cronbach's alpha=0.90; for males and females) . We used the
100 continuous score for the primary analysis.

101 Demographic characteristics gender, age (in years) were self-reported at cohort enrolment.

102 Childhood/adolescence related factors (collected retrospectively). Parental education level, perceived
103 parental support, self-rated economic situation, serious life event (at least one event among: deceased close
104 relative, serious accidents, assaults, unexpected death of a loved one, natural disasters which caused intense
105 fear), having divorcing parents, having brothers or sisters and having a mother or father with depression or
106 anxiety problem.

107 Young-adulthood related factors: university level, university courses in a health domain, students'
108 living conditions, frequency of visits to their parents, main source of income, periodic practice of sport, extra-
109 university activity, Body Mass Index (BMI), sexual intercourse experiences and satisfaction regarding social life.

110 Current mental health conditions were evaluated through the mental health survey at the same time as the
111 self-esteem evaluation: depressive symptoms (PHQ-9), anxiety symptoms (STAI-Y) and perceived stress
112 (Freshman Stress Scale Boujut & Bruchon-Schweitzer, 2009).

113 See Table 1 for details.

114 **Statistical analysis**

116 To identify associated factors of self-esteem, we estimated several models among total sample, male
117 and female subsamples: simple linear regression models, two separate multiple linear regression models for 1-
118 childhood/adolescence factors then for 2-young-adulthood factors, and a multiple linear regression model with
119 both groups of factors entered in the same model. Gender, age and delay between enrolment and mental health
120 survey completion (in months) were all entered as covariates in multiple regression models. We computed R-
121 squared and their 95% confidence interval for each separate model, corresponding to the variance explained by
122 the regression divided by the total variance. We conducted sensitivity analyses: (1) estimating a logistic
123 regression model with dichotomized self-esteem score (corresponding to the third quartile) as the outcome, (2)
124 performing primary modeling in the complete case population, (3) adjusting the complete multivariate model
125 with mental health conditions, and (4) excluding multivariate outliers identified by the method of Mahalanobis
126 distance (6 potential outliers, Appendix 4).

127 Since there were several missing data concerning factors (especially for living conditions 14.8%, sexual
128 intercourse experiences 11.8%, frequency of visits to parents 8.3%, and BMI 5.2%, Appendix 1), we used the
129 MICE (multivariate imputation by chained equations) method for imputation (Rubin & Schenker, 1991). We
130 performed all analyses using the SAS statistical software (SAS version 9.3; SAS Institute Inc, Cary, NC).

131 **RESULTS**

132 Mean self-esteem score was 28.2 (SD=5.8) with 31.5% of low self-esteem (<25). Full description
133 available in Table 1, and additional information available in appendix 2 and 5). All assumptions for linear
134 regression were checked and no clear violation was found (Appendix 3). Results from simple, separate and total
135 model were quite similar, showing independent effects of almost all the factors (except parental education,
136 divorce and having brothers or sisters). Therefore, we only presented total model results in Table 2 (Appendix 6

137 and 7 for simple and separate models). Regarding childhood/adolescence factors, having experienced a serious
138 event in life and having parents with depression or anxiety were associated with lower self-esteem during
139 college. A difficult economic situation during childhood was associated with lower self-esteem only in females.
140 Weak parental support during childhood was associated with lower self-esteem for both genders but effect was
141 larger among females. Regarding young-adulthood factors, the freshman year, studying other domain than
142 health, higher BMI and being virgin or having homosexual intercourse were associated with lower self-esteem.
143 Having a student job as the main source of income during college and practicing an extra-university activity
144 were associated with higher self-esteem. Practicing periodic sport and being satisfied with social life were
145 associated with higher self-esteem in both genders, but effects were larger among males. Subset of factors
146 related to young adulthood seem to explain more self-esteem variability among males (8.53%; 95% CI 5.38-
147 9.91) than factors related to childhood/adolescence (4.94; 95% CI 2.68-6.23), whereas the opposite was observed
148 for females (respectively 4.83%; 95% CI 3.66-5.52 for young adulthood and 6.52; 95%CI 5.32-7.45 for
149 childhood/adolescence) (Figure 2).Sensitivity analyses showed consistent findings within the complete case
150 population, , excluding outliers and using dichotomized self-esteem (Appendix 9-11). When mental health
151 variables were entered into the model, several factors (i.e. familial support, economic situation during
152 childhood/adolescence, the freshman year, having a student job, BMI, sexual intercourse and being satisfied with
153 social life) were still significantly associated with self-esteem (Appendix 8), showing independent effects from
154 mental health conditions. For other factors, associations were no longer significant (i.e. serious life event, father
155 with depressive problem, studying in a health domain, practicing sports or extra-university activities), or were in
156 the opposite direction (i.e. mother with depressive symptoms associated with higher self-esteem).

157 **DISCUSSION**

158 Several factors related to childhood/adolescence and young-adulthood were found to be associated with
159 self-esteem during college. Interestingly, there were differences according to gender with a larger effect of
160 parental support and economic situation during childhood among females and a larger effect of sports practice
161 and satisfaction with social life during young adulthood among males. These results were concordant with the
162 proportion of variability explained by the two groups of factors (childhood/adolescence factors explained more
163 variability in females whereas young-adulthood factors explained more variability in males). Finally, the effect
164 of several factors lingered when current mental health condition was considered.

165 In line with our findings, weak family support, poor parental attachment and maternal depression were
166 found to be associated with lower self-esteem in several studies (Gorrese & Ruggieri, 2013; Kiviruusu et al.,
167 2016; Mattanah et al., 2011). Our study extends the understanding of self-esteem development across the
168 specific period of young adulthood. In addition, several college-year related factors identified in our study
169 underlined the specific vulnerability of freshmen. A large body of evidence has shown that this transition may be
170 linked with physical, mental and behavioral changes, such as weight gain, stress, depressive symptoms and
171 problematic substance use (Derefinko et al., 2016; Haidar et al., 2018; Kroshus et al., 2021) and with lower self-
172 esteem, as found by this present study. While the college years may be a period of vulnerability for some
173 students, for others they represent an opportunity to live an independent and satisfying life with new social roles
174 that in turn may enhance their self-esteem (Harter, 2006). Our empirical findings are consistent with this
175 hypothesis since practicing sport or extra-university activities and being satisfied with social life during college
176 were found to be associated with higher self-esteem. Moreover, engagement in sexual intercourse represents a
177 major step during young adulthood, for which the association with self-esteem is not consensual (Fielder et al.,
178 2013; Yean et al., 2013). In our study, we observed that being virgin or having homosexual intercours were
179 associated with lower self-esteem compared to engage only in heterosexual intercourse. These findings could
180 reflect the cultural standards of western societies where sexual intercourse is likely to start in late adolescence;
181 around 16-17 years old in European countries (Hansen et al., 2020). Moreover, even if the tendency in society is
182 towards more tolerance of any type of sexual orientation, homosexuality tends to remain stigmatized in college
183 campuses (Chonody et al., 2009). This situation may be analyzed within the framework of the sociometer theory:
184 individuals with homosexual intercours could experience lower self-esteem reflecting the perceived risk of a
185 lack of belong to the heterosexual stereotype (Baumeister & Leary, 1995). This theory could be even more
186 relevant in the context of the college years since students have to create new social relations.

187 Gender differences have received much attention in the self-esteem literature. The gender difference in
188 self-esteem might be explained by the domain-specific self-esteem theory (Rentzsch & Schröder-Abé, 2021;
189 von Soest et al., 2016). This theory assumes that individuals base their self-evaluation on domains that are
190 important for them. If individuals do not achieve the level of performance in the domain that they feel is
191 important for them, their self-esteem will decrease, whereas the impact on self-esteem will be minimal if they do
192 not match their expectancies in another domain of lower importance. Females and males may not place the same
193 importance on the same domain, resulting in a gender difference in levels of self-esteem (Gentile et al., 2009).
194 The major difference between males and females in our study was the variability in self-esteem explained by

195 life-period related factors. Since males and females may place their self-esteem in different domains, this could
196 have a different impact depending on the period of life that might result in different periods of vulnerability in
197 males and females regarding self-esteem development.

198 Unsurprisingly, self-esteem was associated with anxious and depressive symptoms (Baumeister et al.,
199 2003; Orth et al., 2008). The effects of several factors were lingered even after adjustment on mental health
200 reinforce independent effect. Other effects were smaller or canceled after adjustment on current mental health
201 condition, meaning that mental health conditions could play a mediational role. Future research should
202 investigate these putative pathways with longitudinal data to unravel these interesting mechanisms.

203 Our study has several strengths. First, the large sample size allowed several associated factors to be
204 entered in the models while keeping sufficient statistical power. Second, they covered a wide range of life
205 dimensions (i.e. living conditions, family structure and support, economic and social dimensions). Third, our
206 sample was based on the French population while the self-esteem literature has been largely based on the North
207 American population until now. Since self-esteem is very closely linked to cultural dimension, knowledge
208 acquired in North American population cannot be generalized to other contexts such as the European population.
209 Additionally, differences and similarities in self-esteem development between cultures can provide interesting
210 insights (Chen et al., 2021). Lastly, global self-esteem score is reliable and valid.

211 Our study also has some limitations. Although we were able to enter variables related to childhood and
212 adolescence, the participants declared information during their young adulthood (retrospective collection of
213 childhood/adolescence factors), which represents more the mental representation that individuals may have
214 retained (with potential memorization bias) rather than the real situation. Self-esteem was measured only during
215 young adulthood and we did not have any information regarding its level during childhood and adolescence, and
216 thus about how self-esteem has change. Another limitation is the voluntary nature of the recruitment. However,
217 even if generalization of the results could be limited, selection bias should be minimal because study
218 participation was not linked to self-esteem level. At no moment the communication campaign mentioned the
219 subject of self-esteem (recruitment in the i-Share cohort was based on global communication about well-being
220 and health among college students). Finally, we explore in this study the factors involved in self-esteem change
221 across life; investigated more the “state” part of the concept rather than the “trait” part. This might explain the
222 modest total variance explained by all factors included in our models (13% in total). A large part of the self-

223 esteem variability might be explained by a self-esteem trait that is more related to psychological traits such as
224 personality (Baumeister et al., 2003) in line with the neo-socioanalytic theory.

225 **Conclusions**

226 Our study originally investigated factors linked with self-esteem across two main life period,
227 considering together factors related to childhood, adolescence and young adulthood. In an interventional
228 perspective, a better understanding of the period during which it is possible to intervene is crucial, since most
229 interventions focusing on self-esteem enhancement are performed, till now, during childhood or adolescence and
230 most validated interventions are not transferable to older populations (Niveau et al., 2021). Our findings point to
231 a multiple time period window (at least twice: during childhood/adolescence and during young adulthood) with
232 some childhood factors independently associated with young-adulthood self-esteem and others that are more
233 proximal and specific to the college years such as social support. Some factors were associated differently
234 according to gender, so interventions might be performed on a gender-specific basis. Interventions with a social
235 dimension (dual presentation, talking circles) during childhood/adolescence might be more effective in females
236 whereas those focusing on peer attachment (tutoring, mentoring) and physical activities during young adulthood
237 could be more suitable for males. Interventional researches should benefit of a gender-specific construction and
238 evaluation of new interventions targeted self-esteem.

239

240 **REFERENCES**

- 241 Baumeister, R. F., Campbell, J. D., Krueger, J. I., & Vohs, K. D. (2003). Does High Self-Esteem
 242 Cause Better Performance, Interpersonal Success, Happiness, or Healthier Lifestyles? *Psychological*
 243 *Science in the Public Interest: A Journal of the American Psychological Society*, 4(1), 1-44.
 244 <https://doi.org/10.1111/1529-1006.01431>
- 245 Baumeister, R. F., & Leary, M. R. (1995). The need to belong : Desire for interpersonal attachments as
 246 a fundamental human motivation. *Psychological Bulletin*, 117(3), 497-529.
 247 <https://doi.org/10.1037/0033-2909.117.3.497>
- 248 Birkeland, M. S., Melkevik, O., Holsen, I., & Wold, B. (2012). Trajectories of global self-esteem
 249 development during adolescence. *Journal of Adolescence*, 35(1), 43-54.
 250 <https://doi.org/10.1016/j.adolescence.2011.06.006>
- 251 Blascovich, J., & Tomaka, J. (2013). Measures of Self-Esteem. In J. P. Robinson, P. R. Shaver, & L.
 252 S. Wrightsman, *Measures of Personality and Social Psychological Attitudes : Measures of Social*
 253 *Psychological Attitudes* (p. 115-123). Academic Press.
- 254 Bleidorn, W., Arslan, R. C., Denissen, J. J. A., Rentfrow, P. J., Gebauer, J. E., Potter, J., & Gosling, S.
 255 D. (2016). Age and gender differences in self-esteem—A cross-cultural window. *Journal of*
 256 *Personality and Social Psychology*, 111(3), 396-410. <https://doi.org/10.1037/pspp0000078>
- 257 Boujut, E., & Bruchon-Schweitzer, M. (2009). A Construction and Validation of a Freshman Stress
 258 Questionnaire : An Exploratory Study. *Psychological Reports*, 104(2), 680-692.
 259 <https://doi.org/10.2466/pr0.104.2.680-692>
- 260 Brent Donnellan, M., Kenny, D. A., Trzesniewski, K. H., Lucas, R. E., & Conger, R. D. (2012). Using
 261 trait–state models to evaluate the longitudinal consistency of global self-esteem from adolescence to
 262 adulthood. *Journal of Research in Personality*, 46(6), 634-645.
 263 <https://doi.org/10.1016/j.jrp.2012.07.005>
- 264 Chambon, O., Cornillon-Jacoudon, D., Germain, MH., Assouline, B., Landazuri, F., & Marie-Cardine,
 265 M. (1992). *Bien-être subjectif et qualité de vie. Définitions, mesures et facteurs déterminants.*
 266 *Implications thérapeutiques. Suppl 5: LVII-LXII.*
- 267 Chen, H.-Y., Ng, J., & Pomerantz, E. M. (2021). Why is Self-Esteem Higher Among American than
 268 Chinese Early Adolescents? The Role of Psychologically Controlling Parenting. *Journal of Youth and*
 269 *Adolescence*, 50(9), 1856-1869. <https://doi.org/10.1007/s10964-021-01474-4>
- 270 Chonody, J. M., Siebert, D. C., & Rutledge, S. E. (2009). College Students' Attitudes Toward Gays
 271 and Lesbians. *Journal of Social Work Education*, 45(3), 499-512.
 272 <https://doi.org/10.5175/JSWE.2009.200800002>
- 273 Derefinko, K. J., Charnigo, R. J., Peters, J. R., Adams, Z. W., Milich, R., & Lynam, D. R. (2016).
 274 Substance Use Trajectories From Early Adolescence Through the Transition to College. *Journal of*
 275 *Studies on Alcohol and Drugs*, 77(6), 924-935. <https://doi.org/10.15288/jsad.2016.77.924>
- 276 Fielder, R. L., Walsh, J. L., Carey, K. B., & Carey, M. P. (2013). Predictors of Sexual Hookups : A
 277 Theory-Based, Prospective Study of First-Year College Women. *Archives of Sexual Behavior*, 42(8),
 278 1425-1441. <https://doi.org/10.1007/s10508-013-0106-0>
- 279 Garber, J., & Flynn, C. (2001). Predictors of Depressive Cognitions in Young Adolescents. *Cognitive*
 280 *Therapy and Research*, 25(4), 353-376. <https://doi.org/10.1023/A:1005530402239>
- 281 Gentile, B., Grabe, S., Dolan-Pascoe, B., Twenge, J. M., Wells, B. E., & Maitino, A. (2009). Gender

282 Differences in Domain-Specific Self-Esteem : A Meta-Analysis. *Review of General Psychology*,
283 13(1), 34-45. <https://doi.org/10.1037/a0013689>

284 Gorrese, A., & Ruggieri, R. (2013). Peer attachment and self-esteem : A meta-analytic review.
285 *Personality and Individual Differences*, 55(5), 559-568. <https://doi.org/10.1016/j.paid.2013.04.025>

286 Haidar, S. A., de Vries, N. K., Karavetian, M., & El-Rassi, R. (2018). Stress, Anxiety, and Weight
287 Gain among University and College Students : A Systematic Review. *Journal of the Academy of*
288 *Nutrition and Dietetics*, 118(2), 261-274. <https://doi.org/10.1016/j.jand.2017.10.015>

289 Hansen, B. T., Kjær, S. K., Arnheim-Dahlström, L., Liaw, K.-L., Juul, K. E., Thomsen, L. T.,
290 Frederiksen, K., Elfström, K. M., Munk, C., & Nygård, M. (2020). Age at first intercourse, number of
291 partners and sexually transmitted infection prevalence among Danish, Norwegian and Swedish
292 women : Estimates and trends from nationally representative cross-sectional surveys of more than 100
293 000 women. *Acta Obstetrica et Gynecologica Scandinavica*, 99(2), 175-185.
294 <https://doi.org/10.1111/aogs.13732>

295 Harter, S. (2006). The Development of Self-Esteem. In *Self-esteem issues and answers : A sourcebook*
296 *of current perspectives* (p. 144-150). Psychology Press.

297 Huurre, T., Aro, H., & Rahkonen, O. (2003). Well-being and health behaviour by parental
298 socioeconomic status : A follow-up study of adolescents aged 16 until age 32 years. *Social Psychiatry*
299 *and Psychiatric Epidemiology*, 38(5), 249-255. <https://doi.org/10.1007/s00127-003-0630-7>

300 Kiviruusu, O., Kontinen, H., Huurre, T., Aro, H., Marttunen, M., & Haukkala, A. (2016). Self-esteem
301 and Body Mass Index from Adolescence to Mid-adulthood. A 26-year Follow-up. *International*
302 *Journal of Behavioral Medicine*, 23(3), 355-363. <https://doi.org/10.1007/s12529-015-9529-4>

303 Krauss, S., Orth, U., & Robins, R. W. (2020). Family Environment and Self-Esteem Development : A
304 Longitudinal Study from Age 10 to 16. *Journal of personality and social psychology*, 119(2), 457-478.
305 <https://doi.org/10.1037/pspp0000263>

306 Kroshus, E., Hawrilenko, M., & Browning, A. (2021). Stress, self-compassion, and well-being during
307 the transition to college. *Social Science & Medicine (1982)*, 269, 113514.
308 <https://doi.org/10.1016/j.socscimed.2020.113514>

309 Lowery, S. E., Kurpius, S. E. R., Befort, C., Blanks, E. H., Sollenberger, S., Nicpon, M. F., & Huser,
310 L. (2005). Body Image, Self-Esteem, and Health-Related Behaviors Among Male and Female First
311 Year College Students. *Journal of College Student Development*, 46(6), 612-623.
312 <https://doi.org/10.1353/csd.2005.0062>

313 Luo, H., Chen, J., Li, S., Nie, Y., & Wang, G. (2021). Social exclusion and impulsive buying among
314 chinese college students : The mediating role of self-esteem and the moderating role of risk
315 preference. *International Journal of Environmental Research and Public Health*, 18(21). Scopus.
316 <https://doi.org/10.3390/ijerph182111027>

317 Mattanah, J. F., Lopez, F. G., & Govern, J. M. (2011). The contributions of parental attachment bonds
318 to college student development and adjustment : A meta-analytic review. *Journal of Counseling*
319 *Psychology*, 58(4), 565-596. <https://doi.org/10.1037/a0024635>

320 Mwakanyamale, A. A., Wandu, D. P., & Yizhen, Y. (2018). Multi-type child maltreatment :
321 Prevalence and its relationship with self-esteem among secondary school students in Tanzania. *BMC*
322 *Psychology*, 6(1), 35. <https://doi.org/10.1186/s40359-018-0244-1>

323 Niveau, N., New, B., & Beaudoin, M. (2021). Self-esteem Interventions in Adults – A Systematic
324 Review and Meta-analysis. *Journal of Research in Personality*, 94, 104131.

325 <https://doi.org/10.1016/j.jrp.2021.104131>

326 Orth, U., Erol, R. Y., & Luciano, E. C. (2018). Development of self-esteem from age 4 to 94 years : A
327 meta-analysis of longitudinal studies. *Psychological Bulletin*, *144*(10), 1045-1080.
328 <https://doi.org/10.1037/bul0000161>

329 Orth, U., Robins, R. W., & Roberts, B. W. (2008). Low self-esteem prospectively predicts depression
330 in adolescence and young adulthood. *Journal of Personality and Social Psychology*, *95*(3), 695-708.
331 <https://doi.org/10.1037/0022-3514.95.3.695>

332 Rentzsch, K., & Schröder-Abé, M. (2021). Top down or bottom up? Evidence from the longitudinal
333 development of global and domain-specific self-esteem in adulthood. *Journal of Personality and*
334 *Social Psychology*. <https://doi.org/10.1037/pspp0000393>

335 Rosenberg, M. (1989). *Society and the adolescent self-image*, Rev. Ed. Wesleyan University Press.

336 Rubin, D. B., & Schenker, N. (1991). Multiple imputation in health-care databases : An overview and
337 some applications. *Statistics in Medicine*, *10*(4), 585-598. <https://doi.org/10.1002/sim.4780100410>

338 Sacks, D., Canadian Paediatric Society, & Adolescent Health Committee. (2003). Age limits and
339 adolescents. *Paediatrics & Child Health*, *8*(9), 577. <https://doi.org/10.1093/pch/8.9.577>

340 Shang, Y., Xie, H.-D., & Yang, S.-Y. (2021). The Relationship Between Physical Exercise and
341 Subjective Well-Being in College Students : The Mediating Effect of Body Image and Self-Esteem.
342 *Frontiers in Psychology*, *12*. Scopus. <https://doi.org/10.3389/fpsyg.2021.658935>

343 Specht, J., Bleidorn, W., Denissen, J. J. A., Hennecke, M., Hutteman, R., Kandler, C., Luhmann, M., Orth, U., Reitz, A. K.,
344 & Zimmermann, J. (2014). What Drives Adult Personality Development? A Comparison of
345 Theoretical Perspectives and Empirical Evidence. *European Journal of Personality*, *28*(3), 216-230.
346 <https://doi.org/10.1002/per.1966>

347 Twenge, J. M., & Campbell, W. K. (2001). Age and Birth Cohort Differences in Self-Esteem : A
348 Cross-Temporal Meta-Analysis. *Personality and Social Psychology Review*, *5*(4), 321-344.
349 https://doi.org/10.1207/S15327957PSPR0504_3

350 von Soest, T., Wichstrøm, L., & Kvaalem, I. L. (2016). The development of global and domain-specific
351 self-esteem from age 13 to 31. *Journal of Personality and Social Psychology*, *110*(4), 592-608.
352 <https://doi.org/10.1037/pspp0000060>

353 Yean, C., Benau, E. M., Dakanalis, A., Hormes, J. M., Perone, J., & Timko, C. A. (2013). The
354 relationship of sex and sexual orientation to self-esteem, body shape satisfaction, and eating disorder
355 symptomatology. *Frontiers in Psychology*, *4*, 887. <https://doi.org/10.3389/fpsyg.2013.00887>

356

357

Table 1. Description of study sample, i-Share cohort

	Total, n=6602		Female, n=5204		Male, n=1398	
	Mean/n	(SD)/(%)	Mean/n	(SD)/(%)	Mean/n	(SD)/(%)
Self-esteem						
Continuous score	28.2	(5.8)	27.6	(5.7)	30.3	(5.7)
Low self-esteem (<25)	2081	(31.5)	1805	(34.7)	276	(19.7)
Sociodemographic factors						
Female	5204	(78.8)	-	-	-	-
Age (in years)	20.7	(2.2)	20.6	(2.1)	21.1	(2.4)
Delay between enrolment and mental health survey (in months)	12.7	(10.9)	12.7	(10.8)	12.9	(11.2)
Factors related to Childhood/Adolescence						
Parental education level higher than baccalaureate	1846	(29.6)	1480	(30.2)	366	(27.6)
Having divorcing parents	1981	(30.9)	1586	(31.4)	395	(29.1)
Having brothers or sisters	5993	(91.8)	4717	(91.5)	1276	(92.7)
Weak perceived parental support	1685	(25.9)	1309	(25.5)	376	(27.3)
Difficult self-rated economic situation	2948	(44.7)	2318	(44.6)	630	(45.1)
Having father with depression or anxiety problems	1098	(19.5)	908	(20.4)	190	(15.8)
Having mother with depression or anxiety problems	2014	(34.1)	1648	(35.4)	366	(29.5)
Serious event as witness or victim	2426	(36.8)	2049	(39.4)	377	(27.0)
Factors related to young adulthood						
Freshmen*	2455	(37.7)	2028	(39.5)	427	(30.9)
Health domain study field	2392	(36.2)	1851	(35.6)	541	(38.7)
Living conditions						
Cohabitation with parents	2004	(35.6)	1555	(35.1)	449	(37.5)
Flat-sharing/couple	1640	(29.2)	1317	(29.7)	323	(27.0)
Alone	1980	(35.2)	1556	(35.1)	424	(35.5)
Frequency of visits to parents (at least once a month)	4566	(75.4)	3604	(76.0)	962	(73.6)
Main source of income						
Scholarship	1693	(25.6)	1370	(26.3)	323	(23.1)
Student job	2579	(39.1)	2023	(38.9)	556	(39.8)
Family	2330	(35.3)	1811	(34.8)	519	(37.1)
Periodic sport practice	3525	(53.4)	2716	(52.2)	809	(57.9)
Extra-university activities	2161	(37.7)	1575	(35.1)	586	(46.8)
BMI (Kg/m ²)	21.5	(3.4)	21.4	(3.4)	22.0	(3.1)
Sexual intercourse experiences						
Virgin	1528	(26.3)	1219	(25.9)	309	(27.6)
At least one homosexual intercourse	159	(2.7)	136	(2.9)	23	(2.1)
Only heterosexual intercourse	4134	(71.0)	3347	(71.2)	787	(70.3)
Dissatisfied with social life	1197	(18.1)	966	(18.6)	231	(16.5)
Current mental health condition						
	Total. n=6468		Female. n=5096		Male. n=1372	
Stress	47.0	(12.5)	48.4	(12.2)	41.7	(12.7)
Anxious symptoms	47.4	(10.7)	48.5	(10.4)	43.5	(10.8)
Depressive symptoms	16.1	(5.4)	16.5	(5.5)	14.7	(4.9)

SD: standard deviation; BMI: body mass index. *others are: 21% second- ; 15% third- and 26% fourth or more year student

Table 2. Multivariate linear regression model results for total models

	Gender- interaction	Total sample, n=6602			Female, n=5204			Male, n=1398		
		Beta	95% CI	p	Beta	95% CI	p	Beta	95% CI	p
Childhood/adolescence-related factors										
Parental education level higher than baccalaureate vs lower	0.6283	0.02	-0.31; 0.34	0.9248						
Having divorcing parent vs no	0.2662	0.29	-0.05; 0.63	0.0946						
Having brothers or sisters vs no	0.4183	0.04	-0.44; 0.52	0.8628						
Weak perceived parental support vs strong	0.0340				-2.05	-2.41; -1.69	<0.0001*	-1.11	-1.78; -0.44	0.0013*
Difficult self-rated economic situation vs comfortable	0.1496				-0.70	-1.04; -0.36	<0.0001*	0.12	-0.54; 0.78	0.7320
Serious event vs no	0.3782	-0.60	-0.88; -0.32	<0.0001*						
Having father with depression or anxiety problems vs no	0.3556	-0.67	-1.29; -0.06	0.0329*						
Having mother with depression or anxiety problems vs no	0.6768	-0.80	-1.12; -0.49	<0.0001*						
Young-adulthood-related factors										
Freshmen vs no	0.8497	-0.45	-0.82; -0.09	0.0157*						
Health domain study vs no	0.9383	0.59	0.31; 0.87	<0.0001*						
Living conditions	0.9989			0.1715						
Flat-sharing/couple vs Cohabitation with parents		0.25	-0.15; 0.65	0.2182						
Alone vs Cohabitation with parents		-0.07	-0.47; 0.33	0.7371						
Frequent visits to parents vs no	0.3919	-0.31	-0.68; 0.06	0.0960						
Main source of income	0.4031			0.0116*						
Scholarship vs family		-0.01	-0.39; 0.36	0.9481						
Student job vs family		0.44	0.11; 0.77	0.0082*						
Periodic sport practice vs no	0.0227				0.44	0.13; 0.75	0.0052*	1.20	0.61; 1.79	<0.0001*
Extra-university activities vs no	0.9294	0.44	0.12; 0.76	0.0076*						
BMI (in kg/m ²)	0.4046	-0.05	-0.09; -0.01	0.0255*						
Sexual intercourse	0.8376			<0.0001*						
Virgin vs only heterosexual intercourse		-0.90	-1.40; -0.41	0.0007*						
At least one homosexual intercourse vs only heterosexual		-1.10	-1.98; -0.23	0.0138*						
Dissatisfied with social life vs satisfied	0.0097				-1.43	-1.82; -1.03	<0.0001*	-2.66	-3.47; -1.85	<0.0001*

95%CI: 95% confidence interval; BMI: Body mass index; p: p-value of Student or Fisher test.

*correspond to p-value still significant after multiple testing adjustment using False Discovery Rate method

Figure 1. Flow diagram showing participant flow through study based on i-Share Cohort, France.

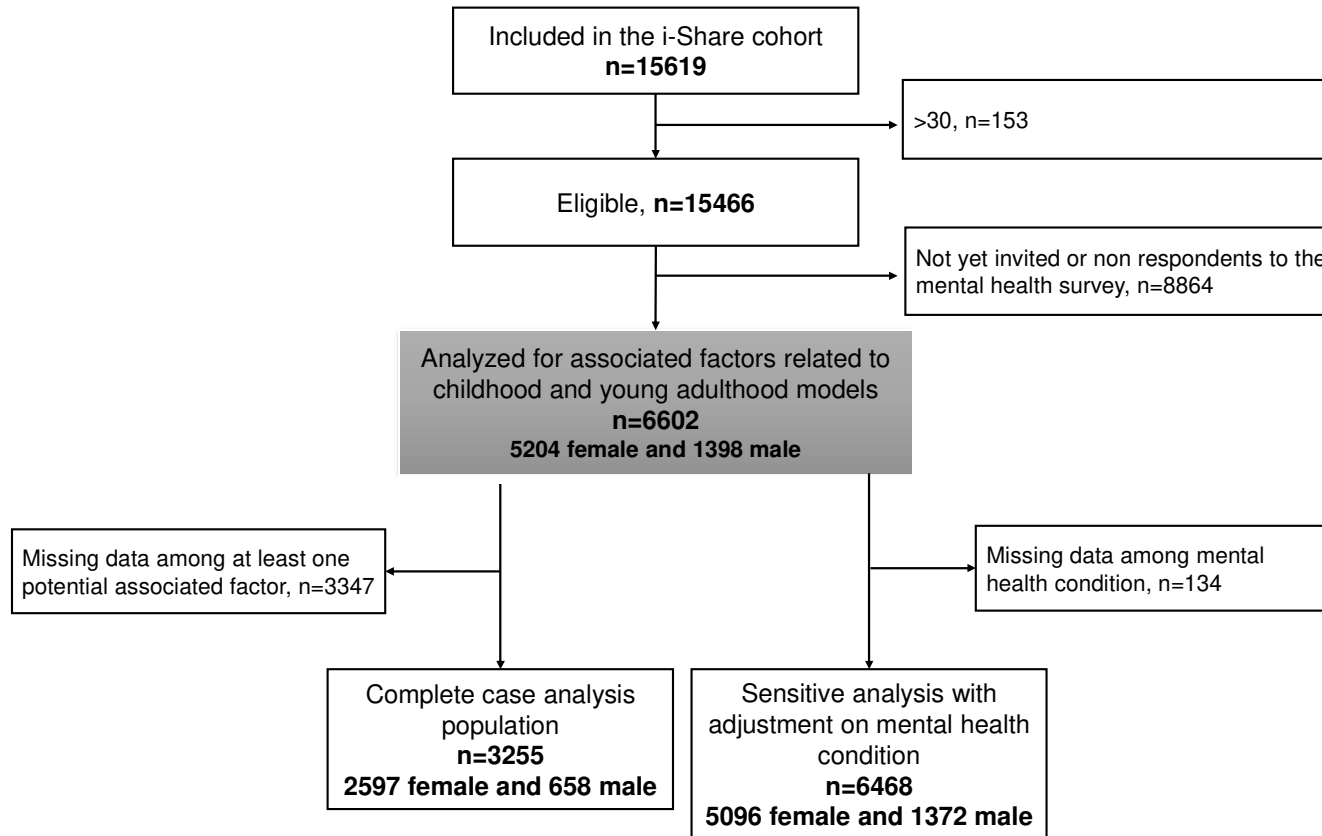


Figure 2. Coefficient of determination (R-squared) and their 95% confidence intervals of separate models for childhood/adolescence-related factors and young-adulthood-related factors in males (n=1398) and females (n=5204), i-Share cohort, France

