Better Than You or Who I Used to Be:

Social Comparison, but Not Temporal Comparison, Maintains Narcissism in Adolescence

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Abstract

Narcissism reflects a belief in one's superiority and entitlement. Why is narcissism persistent in adolescence? Bridging developmental, social, and personality psychology, this research examined whether adolescents high in narcissism maintain narcissism through downward *social* comparisons ("I'm better than you") rather than downward *temporal* comparisons ("I'm better than I was before"). Conducted in Dutch secondary schools (2017-2018), a cross-sectional study (N = 382, 97% Dutch) and intensive longitudinal study (N = 389, 99% Dutch) found that adolescents higher in narcissism made more downward social and temporal comparisons. Unlike downward temporal comparisons, downward social comparisons mediated the 3-month stability of narcissism. Self-esteem was unrelated to downward comparisons. Thus, downward social comparisons maintain adolescent narcissism and could be a mechanism to curtail it.

Keywords: adolescence; narcissism; self-esteem; social comparison; temporal comparison

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Contemporary society offers adolescents myriads of opportunities for social comparison. In school, adolescents often receive normative grades and experience competition over grades (Dijkstra et al., 2008). On social media, adolescents are exposed to the achievements of others, along with numbers of likes, shares, and followers (Nesi & Prinstein, 2015). This contextual emphasis on social comparison coincides with a developmental sensitivity for social comparison information (Yeager et al., 2018). Which adolescents engage in social comparisons more than others? And what are the consequences of these social comparisons for their development? Bridging insights from developmental, social, and personality psychology, we theorize that social comparisons are a central self-regulatory mechanism of the personality trait of *narcissism*.

Narcissism personality is a personality trait characterized by a sense of being more important and entitled than others (Krizan & Herlache, 2018). Narcissism is high in adolescence (Foster et al., 2003) and puts adolescents at risk of maladjustment, including anxiety, depression, aggression, and problematic peer social relationships (Thomaes & Brummelman, 2016). Unfortunately, little is known about the developmental processes that maintain narcissism. We posit that adolescents high in narcissism actively maintain their narcissism levels, in part, via downward *social comparisons*—comparing themselves favorably to others (Festinger, 1954). These comparisons portray the self as superior to others. In addition, we posit that adolescents high in narcissism also engage in downward *temporal comparisons*—comparing their present self favorably to their past self (Wilson & Ross, 2000)—but that these temporal comparisons do not maintain their narcissism levels. Such comparisons shed a favorable light on the self, but they do not portray the self as superior to others. We tested these novel hypotheses in a cross-sectional study (Study 1) and an intensive longitudinal study (Study 2) in adolescence, when individuals make frequent social and temporal comparisons (Gürel et al., 2022).

Adolescent Narcissism and Social Comparisons

Adolescents often compare themselves with others (Gürel et al., 2020; Keil et al., 1990). Social comparisons enable them to evaluate whether they are better than others (downward social comparison) or worse than others (upward social comparison; Festinger, 1954; Morina, 2021). Indeed, adolescents have a strong need for competence and social status (Yeager et al., 2018). From the end of elementary school, they frequently seek social comparison information, often subtly, to assess whether the self is superior or inferior to others in terms of valued characteristics (e.g., attractiveness, athletic ability, intellectual ability; e.g., Pomerantz et al., 1995). With the transition from primary to secondary school, adolescents become eager to assess their characteristics in comparison to their newly formed peer group (Midgley et al., 1995). Secondary school contexts are rich in social comparison information and introduce an emphasis on normative grading (e.g., standardized tests, academic ranking, and streams) and social competition (Cimpian, 2017). Overall, adolescents' developmentally salient needs and secondary school contexts are likely to trigger social comparisons.

Several theories suggest that adolescents high in narcissism make more social comparisons than others, and that this could maintain their narcissism levels. The dynamic self-regulatory processing model posits that individuals high in narcissism levels engage in intra- and interpersonal strategies to maintain their grandiose self-views (Morf et al., 2011). The intrapersonal strategies may include downward social comparisons. Similarly, the extended agency model posits that individuals high in narcissism strive for narcissistic esteem (i.e., a sense of dominance and pride that gives an emotional rush; Campbell & Foster, 2007; also see Baumeister & Vohs, 2001). This striving may lead them to engage in downward social comparisons. Also, the Status Pursuit In Narcissism (SPIN) model argues that individuals high in narcissism have a dominant desire for social status (Grapsas et al., 2020; also see Zeigler-Hill et al., 2018). This desire may lead them to engage in downward social comparisons. More broadly, self-verification theory (Swann, 2012) holds that individuals seek out and embrace information that is consistent with their self-views. For individuals high in narcissism,

downward social comparison information is consistent with their self-views. Thus, various motives might lead adolescents high in narcissism to make downward social comparisons.

Do adolescents higher in narcissism indeed make more frequent downward social comparisons than others? Although this has not been studied in adolescence, there is indirect evidence in adults. Adults with a Narcissistic Personality Disorder are often "condescending toward others," firmly hold on "to the belief that [they are] better than others," and excessively "reference to others for self-definition" (American Psychiatric Association, 2013, pp. 767–768). Empirical studies show that adults higher in narcissism make more downward social comparisons. A set of correlational studies shows that adults high in narcissism often see themselves as above average (Campbell et al., 2002). A correlational study shows that adults higher in narcissism make more downward social comparisons (Krizan & Bushman, 2011). A daily diary study assessed adults' social comparisons over a period of three days and found that adults higher in narcissism made more downward social comparisons (Bogart et al., 2004).

Do these downward social comparisons, in turn, maintain narcissism? With maintenance, we refer to the rank-order stability of narcissism over time, rather than its mean-level stability. If a psychological process maintains narcissism, it should mediate the rank-order stability of narcissism, explaining why some individuals continue to be more or less narcissistic than their peers. Although no studies have studied the role of downward social comparison in the maintenance of narcissism, indirect evidence supports it. When adolescents make downward social comparisons, they notice a favorable gap between themselves and others. This may reinforce their grandiose self-views and put them in competition with others to maintain or increase the gap (Tesser, 1988). For example, an experimental study (Gürel et al., 2020) shows that downward social comparisons cause children and adolescents to feel proud and to desire superiority over others at the expense of improving themselves. Similarly, a daily diary study (Gürel et al., 2022) shows that on days when adolescents make more downward social comparisons, they feel prouder and desire more strongly for superiority over others at the expense of improving themselves. A sense of pride and desire for

superiority are central to narcissism (Brummelman & Sedikides, 2020). Thus, by engaging in downward social comparisons, adolescents high in narcissism might maintain their own narcissism levels over time. Our research is the first to examine this possibility.

Adolescent Narcissism and Temporal Comparisons

Here, we also focus on a type of comparison that is often overlooked: temporal comparisons, which are frequent among adolescents (Gürel et al., 2020, 2022). Unlike social comparisons, temporal comparisons are with one's own self across time rather than with others (Albert, 1977; Morina, 2021). Temporal comparisons enable individuals to evaluate whether their present self is better than their past self (downward temporal comparisons) or worse than their past self (upward temporal comparisons; Albert, 1977; Gürel et al., 2020; Wilson & Ross, 2000). Research suggests that temporal comparisons are more frequent than social comparisons (Wayment & Taylor, 1995; Wilson & Ross, 2000), even in adolescence (Gürel et al., 2022). Even when social comparison information is available, individuals frequently make temporal comparisons (Zell & Alicke, 2009).

We theorize that adolescents high in narcissism make frequent downward temporal comparisons. According to the dynamic self-regulatory processing model, individuals high in narcissism might reconstruct their past self to see their present self more positively (Morf et al., 2011). Similarly, temporal self-appraisal theory (Wilson & Ross, 2000, 2001) posits that individuals sometimes derogate their past self to create a more positive present self. Research shows that downward temporal comparisons make adolescents feel proud (Gürel et al., 2020; also see Taylor et al., 1996; Zell & Alicke, 2009). Thus, adolescents high in narcissism might make downward temporal comparisons in an attempt to self-enhance.

We also theorize that downward temporal comparisons, unlike downward social comparisons, are unlikely to maintain narcissism over time. Downward temporal comparisons involve comparisons with one's own self over time, not with others (Albert, 1977), so they are likely to trigger competition with one's own self, not with others (Gürel et al., 2020). Downward temporal comparisons focus adolescents on how they can improve themselves over time, such as by helping

them realize that their characteristics are malleable (Butler, 2000; Gürel et al., 2020). Accordingly, an experimental study (Gürel et al., 2020) showed that downward temporal comparisons did not trigger superiority goals; instead, they made adolescents desire to improve themselves over time, while giving them a sense of progress and insight. Similarly, a daily diary study (Gürel et al., 2022) showed that on days when adolescents made more downward temporal comparisons, they felt prouder, adopted more improvement goals over superiority goals, and felt more related to others. Hence, downward temporal comparisons may not foster the narcissistic tendency to see oneself as superiority to others or to desire superiority over others.

Narcissism Versus Self-Esteem

Narcissism should be separated from self-esteem. Psychologists often define narcissism as inflated, excessive, or exaggerated self-esteem, suggesting that narcissism is a form of high self-esteem (Brummelman et al., 2016; Trzesniewski et al., 2013). Although narcissism and self-esteem both involve favorable self-evaluations, they are conceptually and empirically distinct (Brummelman et al., 2016), and they have unique nomological networks (Hyatt et al., 2018). Narcissism and self-esteem are weakly positively related in adolescence (Thomaes & Brummelman, 2016). Most notably, adolescents high in narcissism see themselves as superior to others (but not necessarily as worthy), whereas those with high self-esteem see themselves as worthy (but not necessarily as superior to others; Brummelman et al., 2018).

What types of comparisons do adolescents with high self-esteem make? And what are the consequences of these comparisons for their subsequent self-esteem levels? Compared to adolescents high in narcissism, those with high self-esteem exhibit a weaker motivation to create grandiose self-views, gain narcissistic esteem, or pursue social status—more broadly, they have a weaker tendency to self-enhance (Brummelman et al., 2016; Brummelman & Sedikides, 2020). Specifically, while adolescents high in narcissism seem driven by self-enhancement, those with high self-esteem seem driven by self-protection (Sedikides & Gregg, 2001). For this reason, adolescents with high self-esteem may not be inclined to make downward comparisons, regardless of whether

these comparisons are social or temporal. Rather than making *downward* comparisons, they may simply refrain from making *upward* comparisons. Indeed, research shows that adults with higher self-esteem do not make more downward social comparisons, but they do make fewer upward social comparisons (Krizan & Bushman, 2011; Taylor et al., 1996; Wheeler & Miyake, 1992). This suggests a self-verification process (Swann, 2012), where adolescents with lower self-esteem seek out and embrace information that verifies their negative self-views. These upward comparisons may, in turn, maintain lower levels of self-esteem over time. Experimental evidence in adolescents shows that upward comparisons reduce pride and trigger shame, regardless of whether these comparisons are social or temporal (Gürel et al., 2020). Taken together, upward comparisons could maintain low self-esteem over time.

The Present Study

This research investigated, for the first time, social and temporal comparisons as psychological mechanisms in the maintenance of narcissism and self-esteem in adolescence. This means that we investigated whether and how these comparisons explained the *rank-order stability* of narcissism and self-esteem. We conducted a cross-sectional study (Study 1) and an intensive longitudinal study (Study 2) in the key age of adolescence, ages 11-15. At this age, narcissism rises (Foster et al., 2003), self-esteem falls (Robins & Trzesniewski, 2005), and adolescents frequently engage in social and temporal comparisons (Gürel et al., 2022).

First, we hypothesized that adolescents with higher narcissism would engage in more downward social and temporal comparisons, and that downward social comparisons—but not downward temporal comparisons—would mediate the rank-order stability of narcissism. Second, we hypothesized that adolescents with higher self-esteem would engage in fewer upward social and temporal comparisons, and that these upward comparisons would mediate the rank-order stability of self-esteem.

Study 1

We first conducted a cross-sectional study to examine associations between adolescents' narcissism, self-esteem, and social and temporal comparison tendencies.

Method

Participants. This study was conducted in the same sample as a prior study [masked for review]. We selected 11-15-year-old participants (early-to-mid adolescence) who participated in a questionnaire study that was conducted several days before this prior study. The sample utilized here involved 382 adolescents (53.7% girls) aged 11-15 years (M_{age} = 12.46 year, *SD* = 1.23; 97.1% of Dutch origin) residing in the Netherlands. All participants received active parental consent (parental consent rate = 67%). All procedures were approved by the Ethics Review Board of the Faculty of [masked for review]. Data were collected between February and July 2017 from Dutch secondary schools serving lower-to-upper middle-class families.

Transparency and openness. We report how we determined our sample size, all data exclusions (if any), and all measures in the study. Based on a previous study (Krizan & Bushman, 2011), a power analysis in G*power (effect size |ρ| = 0.18, α = 0.05, two-tailed, power = 0.80; Faul et al., 2007) showed that the required sample size was 237 participants. We oversampled to ensure sufficient power, because we could not know in advance how many parents would provide consent. The study materials, study protocol, variable codebook, data, and analysis scripts are available on OSF at https://osf.io/tesby/?view_only=4efe7232e3d84487bc21a44841bea41e. The study was not preregistered. The study also included variables that are not relevant to our current research questions and are therefore not reported here (listed in the codebook available via OSF).

Procedure and measures. Participants completed questionnaires in their classrooms. All items were rated on four-point scales (0 = *not at all true*, 3 = *completely true*). For each scale, responses were averaged across items. We measured trait narcissism using the 10-item Childhood Narcissism Scales (Thomaes et al., 2008). Sample items include: "I am a very special person" and "Kids like me deserve something extra" (*M* = 1.13, *SD* = 0.47, Cronbach's α = .78). We measured self-esteem using the 10-item Rosenberg Self-esteem Scale (Rosenberg, 1965). Sample items include:

"On the whole, I am satisfied with myself" and "I feel that I have a number of good qualities" (*M* = 2.73*, SD* = 0.46, Cronbach's α = .81). The five negatively worded items (e.g., "I certainly feel useless at times") were reverse coded. We measured comparison tendencies using the Social and Temporal Comparison Tendencies Scale, constructed for the purpose of this study (Supporting Information, Table S1, reports all items and a factor analysis). Three items assessed downward social comparisons (e.g., "I often think about how I am better than my classmates;" *M* = 0.82*, SD* = 0.65, Cronbach's α = .84), three items assessed upward social comparisons (e.g., "I often think about how I am worse than my classmates," *M* = 0.74*, SD* = 0.67, Cronbach's α = .86), three items assessed downward temporal comparisons (e.g., "I often think about how I am better now than when I was younger;" *M* = 1.38*, SD* = 0.78, Cronbach's α = .80), and three items assessed upward temporal comparisons (e.g., "I often think about how I am worse now than when I was younger," *M* = 0.57*, SD* = 0.64, Cronbach's α = .83).

We used two-tailed testing at α = .05.

Results

Preliminary analysis. There were four univariate outliers for downward social comparisons, six for upward social comparisons, four for upward temporal comparisons ($z > 3.29$), and two for self-esteem ($z < -3.29$). However, none of these outliers unduly influenced our results (Cook's distances < 1) and excluding them did not change our pattern of findings. We therefore reported results including these outliers.

Main analyses. Table S2 provides descriptive statistics and zero-order correlations. Narcissism and self-esteem were weakly positively correlated.

As hypothesized, narcissism was positively related to downward social comparisons, $r(375) = .56$, $p < .001$, and to downward temporal comparisons, $r(375) = .26$, $p < .001$. By contrast, narcissism was not significantly related to upward social comparisons, $r(361) = .09$, $p = .095$. Unexpectedly, narcissism was positively related to upward temporal comparisons, $r(361) = .17$, $p = .001$.

As hypothesized, self-esteem was negatively related to upward social comparisons, $r(361) = -.53$, $p < .001$, and to upward temporal comparisons, $r(361) = -.30$, $p < .001$. By contrast, self-esteem was not significantly related to downward social comparisons, $r(375) = -.01$, $p = .847$, or to downward temporal comparisons, $r(375) = -.03$, $p = .502$.

In sum, adolescents with higher narcissism made more downward comparisons (both social and temporal), whereas adolescents with higher self-esteem made fewer upward comparisons (both social and temporal).

Robustness analyses. To examine the robustness of our findings, we reran the correlation analyses by simultaneously accounting for gender and age as covariates (Table S3). The results remained (i.e., no significant association became non-significant, and no non-significant association became significant), except that the association between narcissism and upward social comparisons became significant, $r(362) = .109$, $p = .039$.

Discussion

Study 1 provides initial evidence for our theoretical predictions. Replicating work with adults (Bogart et al., 2004; Krizan & Bushman, 2011), we found that adolescents with higher narcissism made more downward social comparisons, comparing themselves favorably to others. Extending prior work, we found that adolescents with higher narcissism also made more downward temporal comparisons. These findings were unique to adolescents higher in narcissism, as those with higher self-esteem did not make more downward comparisons. Rather, they made fewer upward comparisons, both social and temporal.

Study 2

Study 1 shows that adolescents higher in narcissism make more downward social comparisons. But do these comparisons constitute a developmental mechanism that maintains narcissism over time? We conducted Study 2 to examine this possibility, using a longitudinal design with daily diary assessments. We assessed adolescents' narcissism and self-esteem levels at the beginning of the school year and at 3-month follow-up. In-between those assessments, we used

daily diaries to index how often adolescents engaged in social and temporal comparisons in their everyday lives.

Method

Participants. All students from first, second, and third grade of a public secondary school were eligible for participation. Data were collected as part of a larger longitudinal project: the Adolescents' Social and Temporal Comparisons Study. A previous paper used the daily diary assessments to examine within-day associations between adolescents' comparisons and emotional states [masked for review]. Here, for the first time, we linked daily diary assessments of comparisons to longitudinal assessments of adolescents' narcissism and self-esteem. All participants received active parental consent (parental consent rate = 58%). All procedures were approved by the Ethics Review Board of [masked for review]. Data were collected on September 18, 2017 (baseline), between September 18 and 22, 2017 (daily diary), and between December 19, 2017, and January 1, 2018 (follow-up) at a secondary school in North Holland serving lower-to-upper middle-class families.

Transparency and openness. We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study. We analyzed our data using structural equation models. A Monte Carlo power analysis for indirect effects (1,000 replications, random seed = 1234, confidence level = 95%, Monte Carlo draws per rep = 20,000; Schoemann et al., 2017), based on the models displayed in Figures 1 and 2 as well as on a sample size of 389, resulted in a statistical power of 1 for the main hypotheses. The study materials from the larger project, study protocol, variable codebook, data, and analysis scripts are available on OSF at https://osf.io/tesby/?view_only=4efe7232e3d84487bc21a44841bea41e. The study also included variables that are not relevant to our current research questions and are therefore not reported here (listed in the codebook available via OSF).

Procedure and measures. On a Monday, one week after the school year began, a total of 389 adolescents (ages 11-15, M_{age} = 12.69 years, *SD* = 0.97; 41.4% girls; 98.9% of Dutch origin)

completed narcissism and self-esteem questionnaires in their classrooms. Three months later, 201 of those adolescents (ages 11-15, M_{age} = 12.79 years, *SD* = 0.97; 45.3% girls; 100% of Dutch origin) completed an online follow-up survey questionnaire. At each assessment, adolescents reported how they perceived themselves "the past three months." We measured narcissism with the Childhood Narcissism Scale (Thomaes et al., 2008), rated on four-point scales (0 = *not at all true*, 3 = *completely true*). Responses were averaged across items ($M_{baseline}$ = 1.01*,* $SD_{baseline}$ = 0.44, Cronbach's $\alpha_{baseline}$ = .79; $M_{follow\text{-}up}$ = 1.02*,* $SD_{follow\text{-}up}$ = 0.50, Cronbach's $\alpha_{follow\text{-}up}$ = .84). We measured self-esteem using the 6-item Global Self-Worth subscale of the Self-Perception Profile for Children (e.g., "Some kids like the kind of person they are"; Harter, 1985), rated on four-point scales (0 = *I am not like these children at all*, 3 = *I am exactly like these children*). After reverse scoring three negatively worded items (e.g., "Some kids are often unhappy with themselves"), responses were averaged across items ($M_{baseline}$ = 2.23*,* $SD_{baseline}$ = 0.51, Cronbach's $\alpha_{baseline}$ = .82; $M_{follow\text{-}up}$ = 2.18*,* $SD_{follow\text{-}up}$= 0.59, Cronbach's $\alpha_{follow\text{-}up}$ = .84).

Immediately following the assessment, from Monday through Friday, adolescents completed online daily diary assessments at home after school hours, reporting the comparisons they engaged in that day. We measured social and temporal comparisons using one item per comparison type to reduce their burden on participants (as was done successfully in prior research: Gürel et al., 2022): "Today at school, I thought I was better than my classmates" (downward social comparison; *M* = 1.40*, SD* = 0.47, Cronbach's α across 5 days = .82), "Today at school, I thought I was worse than my classmates" (upward social comparison; *M* = 1.34*, SD* = 0.43, Cronbach's α across 5 days = .74), "Today at school, I thought I had become better compared to a while ago" (downward temporal comparison; *M* = 2.18*, SD* = 0.70, Cronbach's α across 5 days = .84), and "Today at school, I thought I had become worse compared to a while ago" (upward temporal comparison; *M* = 1.28*, SD* = 0.39, Cronbach's α across 5 days = .78). All items were rated on four-point scales (1 = *not at all true to* 4 = *completely true).* Following prior research (Becht et al., 2017), responses averaged across five days to form a reliable score for each comparison type.

Statistical approach. We used structural equation modeling to examine whether social and temporal comparisons mediated the rank-order stability of narcissism and self-esteem. We ran separate mediation models for narcissism and self-esteem. Adopting a conservative approach that estimated the unique effect of each comparison type, we included each comparison type simultaneously as candidate mediators. The models included self-views at baseline (narcissism, self-esteem) as the predictor, self-views at 3-month follow-up (narcissism, self-esteem) as the outcome, and comparisons (downward social, upward social, downward temporal, upward temporal) as the mediators. Each model tested (a) the direct effect of self-views (narcissism, self-esteem) at baseline on each comparison type; (b) the direct effect of each comparison type on self-views at follow-up, controlling for self-views at baseline; and (c) the direct effect of self-views at baseline on self-views at follow-up, controlling for each comparison type. The indirect effect, then, refers to the effect of the self-views at baseline on self-views at follow-up through comparison types. The total effect refers to the sum of the direct and indirect effects (Hayes, 2022). We used a bootstrapping approach with 1000 iterations to obtain more robust estimates of standard errors. We conducted the analyses in R v.3.6.2 with RStudio v1.2.5033 (R Core Team, 2019) using the lavaan package (Rosseel, 2012). We used two-tailed testing at $\alpha = .05$.

Little's (1988) Missing Completely at Random (MCAR) test indicated that the pattern of missing values was not completely at random, χ^2 (38) = 53.12, $p = .053$. Missing values at follow-up assessments were predicted by baseline narcissism χ^2 (1) = 11.508, $p = .001$ and self-esteem χ^2 (1) = 9.935, $p = .002$, but not by comparisons, ps > .106. Adolescents who withdrew at 3-month follow-up assessment had higher narcissism, $t(384) = 3.84$, $p < .001$, than those who were retained at follow-up. Attrition status at 3-month follow-up was not predicted by their baseline self-esteem, $t(381) = 0.62$, $p = .54$. For this reason, we dealt with missingness in two ways. First, we used full information maximum likelihood (FIML) to account for the pattern of missingness (Muthén & Satorra, 1995). Second, we repeated the analyses excluding all participants who did not complete any of the daily diary assessments or had missing data at baseline or follow-up for narcissism or self-esteem.

Because both strategies produced the same pattern of findings, we report analyses using FIML, as this maximizes statistical power.

Results

Table S4 displays descriptive statistics and zero-order correlations. At baseline, narcissism and self-esteem were weakly positively correlated.

Narcissism. Figure 1 shows the mediational model. As a direct effect, narcissism at baseline positively predicted narcissism at 3-month follow-up, controlling for all comparisons, b = 0.719, β = 0.617, SE = 0.059, p < .001, 95% CI [0.603, 0.836].

Social comparisons. Narcissism at baseline positively predicted downward social comparisons across the subsequent 5-day school period, b = 0.306, β = 0.285, SE = 0.058, p < .001, 95% CI [0.197, 0.416]. Downward social comparisons positively predicted narcissism at 3-month follow-up, controlling for narcissism at baseline, b = 0.234, β = 0.215, SE = 0.073, p = .001, 95% CI [0.081, 0.373]. Thus, as hypothesized, downward social comparisons partially mediated the link between narcissism at baseline and narcissism at 3-month follow-up, b = 0.072, β = 0.061, SE = 0.026, p = .006, 95% CI [0.021, 0.128].

By contrast, narcissism at baseline was not significantly related to upward social comparisons across the subsequent 5-day school period, b = 0.085, β = 0.087, SE = 0.050, p = .093, 95% CI [-0.022, 0.183]. Upward social comparisons did not significantly predict narcissism at 3-month follow-up, controlling for narcissism at baseline, b = -0.048, β = -0.040, SE = 0.073, p = .511, 95% CI [-0.192, 0.094]. Upward social comparisons did not significantly mediate the link between narcissism at baseline and narcissism at follow-up, b = -.004, β = -0.003, SE = 0.008, p = .602, 95% CI [-0.022, 0.009].

Temporal comparisons. Narcissism at baseline positively predicted downward temporal comparisons across the subsequent 5-day school period, b = 0.240, β = 0.151, SE = 0.090, p = .008, 95% CI [0.053, 0.406]. Downward temporal comparisons, however, did not significantly predict narcissism at 3-month follow-up, controlling for narcissism at baseline, b = 0.043, β = 0.059, SE =

0.041, p = .296, 95% CI [-0.043, 0.117]. Thus, as hypothesized, downward temporal comparisons did not significantly mediate the association between narcissism at baseline and narcissism at follow-up, b = 0.010, β = 0.009, SE = 0.011, p = .363, 95% CI [-0.010, 0.036].

By contrast, narcissism at baseline was not significantly related to upward temporal comparisons across the subsequent 5-day school period, b = 0.013, β = 0.014, SE = 0.050, p = .799, 95% CI [-0.088, 0.102]. Upward temporal comparisons did not significantly predict narcissism at 3-month follow-up, controlling for narcissism at baseline, b = -0.073, β = -0.056, SE = 0.080, p = .359, 95% CI [-0.208, 0.103]. Upward temporal comparisons did not significantly mediate the association between narcissism at baseline and narcissism at follow-up, b = -.001, β = -0.001, SE = 0.005, p = .859, 95% CI [-0.010, 0.012].

The total effect of narcissism at baseline on narcissism at follow-up, including all indirect and direct effects, was significant, b = 0.796, β = 0.683, SE = 0.056, p < .001, 95% CI [0.687, 0.905].

Summary. As hypothesized, adolescents higher in narcissism made more downward social comparisons, and these comparisons maintained their narcissism levels over a 3-month period. Also as hypothesized, adolescents higher in narcissism made more downward temporal comparisons, and these comparisons did not significantly maintain their narcissism levels.

Self-Esteem. Figure 2 shows the mediational model. As a direct effect, self-esteem at baseline positively predicted self-esteem at 3-month follow-up, controlling for all comparisons, b = 0.722, β = 0.652, SE = 0.055, p < .001, 95% CI [0.601, 0.824].

Social comparisons. Self-esteem at baseline was not significantly related to downward social comparisons across the subsequent 5-day school period, b = 0.020, β = 0.022, SE = 0.055, p = .713, 95% CI [-0.090, 0.135]. Downward social comparisons did not significantly predict self-esteem at 3-month follow-up, controlling for self-esteem at baseline, b = 0.009, β = 0.008, SE = 0.074, p = .899, 95% CI [-0.136, 0.153]. Downward social comparisons did not significantly mediate the association between self-esteem at baseline and self-esteem at 3-month follow-up, b = 0.000, β = 0.000, SE = 0.004, p = .966, 95% CI [-0.007, 0.012].

By contrast, self-esteem at baseline negatively predicted upward social comparisons across the subsequent 5-day school period, b = -0.251, β = -0.295, SE = 0.044, p < .001, 95% CI [-0.333, -0.157]. Upward social comparisons negatively predicted self-esteem at 3-month follow-up, controlling for self-esteem at baseline, b = -.198, β = -0.152, SE = 0.089, p = .026, 95% CI [-0.379, -0.024]. Thus, as hypothesized, upward social comparisons significantly mediated the link between self-esteem at baseline and self-esteem at follow-up, b = 0.050. β = 0.045, SE = 0.025, p = .045, 95% CI [0.004, 0.102].

Temporal comparisons. Self-esteem at baseline positively predicted downward temporal comparisons across the subsequent 5-day school period, b = 0.189, β = 0.137, SE = 0.067, p = .005, 95% CI [0.061, 0.318]. Downward temporal comparisons, however, did not significantly predict self-esteem at 3-month follow-up, controlling for self-esteem at baseline, b = -0.004, β = -0.005, SE = 0.054, p = .936, 95% CI [-0.114, 0.101]. Downward temporal comparisons did not significantly mediate the association between self-esteem at baseline and self-esteem at follow-up, b = -0.001, β = -0.001, SE = 0.011, p = .940, 95% CI [-0.024, 0.022].

Self-esteem at baseline negatively predicted upward temporal comparisons across the subsequent 5-day school period, b = -.207, β = -0.268, SE = 0.040, p < .001, 95% CI [-0.286, -0.131]. Upward temporal comparisons, however, did not significantly predict self-esteem at 3-month follow-up, controlling for self-esteem at baseline, b = 0.044, β = 0.031, SE = 0.096, p = .643, 95% CI [-0.167, 0.223]. Thus, contrary to our hypotheses, upward temporal comparisons did not significantly mediate the link between self-esteem at baseline and self-esteem at follow-up, b = -0.009, β = -0.008, SE = 0.020, p = .644, 95% CI [-0.046, 0.036].

The total effect of self-esteem at baseline on self-esteem at 3-month follow-up, including all indirect and direct effects, was significant, b = 0.762, β = 0.688, SE = 0.052, p < .001, 95% CI [0.655, 0.860].

Summary. As hypothesized, adolescents with higher self-esteem made fewer upward social comparisons, and these reduced upward social comparisons maintained their self-esteem levels over

a 3-month period. Also as hypothesized, adolescents with higher self-esteem made fewer upward temporal comparisons. Contrary to our hypotheses, however, these reduced upward temporal comparisons did not maintain their self-esteem levels over a 3-month period.

Robustness Analyses

We examined the robustness of our findings in two ways.

First, we tested a series of individual mediation models (one per comparison type) in which we examined the indirect effects of comparisons separately for narcissism and self-esteem (Supporting Information, Figure S1 and S2). The main conclusions remained the same.

Second, we reran our main mediation models (with all comparison types as mediators) with age and gender as covariates (Figures S3 and S4) and we ran individual mediation models (one per comparison type) with age and gender as covariates (Table S5). The results remained the same (i.e., no significant path became non-significant, and no non-significant path became significant), with two exceptions: (1) baseline narcissism significantly predicted upward social comparisons across the subsequent 5-day school period; (2) upward social comparisons across the 5-day school period only marginally significantly mediated the link between self-esteem at baseline and self-esteem at 3-month follow-up. Importantly, baseline self-esteem still significantly predicted upward social comparisons across the subsequent 5-day school period, and upward social comparisons still significantly predicted self-esteem at 3-month follow-up.

Discussion

As a first study of its kind, Study 2 shows that social comparisons can maintain narcissism and self-esteem over time in the critical phase of adolescence. Adolescents higher in narcissism made more downward social comparisons in daily life and doing so maintained their narcissism levels over 3 months. Adolescents with higher self-esteem made fewer upward social comparisons in daily life and doing so maintained their higher self-esteem over 3 months.

General Discussion

Bridging insights from developmental, social, and personality psychology, we examined how social and temporal comparison contribute to the maintenance of narcissism and self-esteem in the critical phase of adolescence. A cross-sectional study (Study 1) shows that adolescents higher in narcissism make more downward social and temporal comparisons. A longitudinal study with daily diary surveys (Study 2) replicates these findings and extends them by showing that downward social comparisons—but not downward temporal comparisons—maintain adolescents' narcissism over a 3-month period. These findings suggest that social comparisons are a critical mechanism through which narcissism levels are maintained in development, and that temporal comparisons are not. Attesting to the specificity of these findings, self-esteem was not consistently related to downward social comparisons; in fact, low self-esteem was maintained through upward social comparisons. Our findings show that comparison strategies play an important role in the maintenance of self-views in adolescence.

Theoretical Implications

Over the years, research has shed important light on the development of narcissism (Orth et al., in press; Thomaes & Brummelman, 2016). Yet, it is unknown how narcissism levels are maintained over time, which is of particular importance in the critical phase of adolescence, when self-views are in flux (Harter, 2012). Since adolescents high in narcissism have unrealistically positive self-views, one may expect that narcissism simply disappears over time, as adolescents are increasingly faced with the undeniable realities of life, such as struggles, failures, exclusions, and rejections (Bianchi, 2018). Challenging this view, our work suggests that adolescents high in narcissism actively maintain their narcissistic self-views by engaging in downward social comparisons. This is consistent with recent models of narcissism (Campbell & Foster, 2007; Grapsas et al., 2020; Morf et al., 2011), which portray narcissism as self-regulatory process. Our work extends these models by showing that narcissistic self-regulatory strategies already take center stage in adolescence, help maintain narcissism over time, and are distinct from strategies used by individuals with high self-esteem. Also, our work shows that not all such strategies maintain narcissism over

time, as temporal comparisons—viewing one's present self as better than one's past self—did not maintain narcissism over time.

How can downward social comparisons maintain narcissism in adolescence? When adolescents frequently make downward social comparisons, they may become more inclined to conclude that they are superior to others. Downward social comparisons are helpful in assessing one's stable positive characteristics (Arnkelsson & Smith, 2000; Ruble & Flett, 1988) and may trigger a desire for superiority over others (Gürel et al., 2020). Consequently, downward social comparisons may feed narcissistic beliefs (e.g., "I am better than others") and motives (e.g., "I want to be better than others"). These processes may be most consequential in adolescence, when narcissism is still in development (Thomaes & Brummelman, 2016) and individuals are sensitive to cues regarding their competence and social status (Yeager et al., 2018).

Notably, our findings uncover the importance of a lesser-known comparison strategy: temporal comparisons. Temporal comparisons have long been understudied (Gürel et al., 2020; Zell & Alicke, 2009), despite early research on their developmental emergence (Butler, 1998; Ruble & Flett, 1988). Our study shows that adolescents high in narcissism make more downward temporal comparisons: They often think about how they have improved. This suggests that adolescents high in narcissism not only derogate others (Grapsas et al., 2020) but also their past selves. This challenges the popular view that individuals high in narcissism see themselves as perfect, as those who are perfect should be unable to improve. In addition, our study also shows that downward temporal comparisons—unlike downward social comparisons—do not maintain narcissism over time. Previous experimental research shows that downward temporal comparisons make adolescents feel proud without teaching them that they are superior to others and without triggering a desire for superiority over others (Gürel et al., 2020, 2022). Importantly, our longitudinal analyses show that downward temporal comparisons do not predict increased self-esteem over a 3-month period. Thus, while these comparisons probably make adolescents feel good about themselves in the moment, they do not seem to contribute to long-term changes in their overall sense of worth.

Our findings extend the literature on narcissism and self-esteem. Consistent with past work, narcissism and self-esteem were only weakly related. Extending past work (Brummelman et al., 2016; Campbell et al., 2002), narcissism and self-esteem had distinct associations with comparisons: Adolescents higher in narcissism made more downward comparisons, whereas those with higher self-esteem made fewer upward comparisons. This may reflect different underlying motives (Sedikides & Gregg, 2001). Adolescents with higher narcissism may be driven primarily by self-enhancement: seeking out and embracing positive information about themselves. Adolescents with higher self-esteem may be driven primarily by self-protection: avoiding negative information about themselves. More broadly, the narcissistic interest in downward social comparison may reflect a generalized view of social relationships as a zero-sum game—seeing the self as superior and others as inferior (Brummelman et al., 2018; Hyatt et al., 2018; Zeigler-Hill et al., 2021).

To what extent are our findings generalizable? We identify to constraints. First, our studies focused on adolescence, a time when narcissism and self-esteem are in flux (Harter, 2012) and social and temporal comparisons are common (Gürel et al., 2022). Later in development, comparisons may be less consequential for the maintenance of narcissism and self-esteem. Second, our studies were conducted in the Netherlands, a Western society. In non-Western cultures, social comparisons are often seen as a tool for self-improvement rather than superiority over others (Watkins, 2007). In such cultures, social comparisons may be less central to narcissism. Thus, our findings cannot readily be generalized to other age groups and other cultures.

Implications for Intervention

Despite several evidence-based interventions that raise self-esteem (O'Mara et al., 2006), little is known about how to curtail narcissism. Social comparison may constitute a potentially malleable developmental mechanisms to curtail narcissism. Social comparison information is omnipresent in adolescents' lives, especially in secondary school contexts (Dijkstra et al., 2008). Interventions may shift adolescents' focus from social comparison to temporal comparison. In secondary schools, for example, this might be achieved by making improvement trajectories more

salient to adolescents via report cards and feedback (Ames, 1992; Corpus et al., 2006; Gürel et al., 2020). Research should examine long-term effects of such intervention strategies on narcissism and self-esteem. Such work would not only establish causality, but could also inform real-world intervention efforts (Brummelman & Walton, 2015).

Strengths, Limitations, and Future Directions

Strengths of our research include its multi-method design, its focus on adolescence, and its novel proposal that social and temporal comparisons have unique roles in the developmental maintenance of self-views. Our study also has limitations. First, we used cross-sectional and longitudinal methods, which are unable to demonstrate causality. Researcher should use experimental manipulations of comparisons and examine their long-term impact on narcissism and self-esteem. Second, our study investigated a 3-month period. The effects of social comparisons may sustain, or even exacerbate, over time (Carlson Jones, 2004). Research should track narcissism and self-esteem over multiple years. Third, our study assessed narcissism as a unitary construct (Thomaes et al., 2008), without separating its agentic and antagonistic features (Back & Morf, 2018). In adults, both features are about equally related to social comparisons (Lange et al., 2016). Research should examine this in adolescents.

Our findings also generate new research directions. Several theoretical accounts and clinical observations suggest that individuals high in narcissism are resistant to change and often quit therapy prematurely (Ellison et al., 2013). A popular explanation is that these individuals believe they are perfect as they are and that improving themselves is neither desirable nor possible. Temporal comparisons might help individuals high in narcissism realize that improvement is both desirable and enjoyable. Temporal comparisons trigger adolescents' desire to improve themselves (Gürel et al., 2020) and are often used by those with a growth mindset, who believe they can improve their skills (Butler, 2000). Research should examine, for example, whether temporal comparisons can make individuals high in narcissism less resistant to change.

Another important question is how individuals high in narcissism acquire their social-comparison tendency tendencies. One possibility is that some children are raised in environments that emphasize the importance of social comparisons. There is indeed evidence that parents of children high in narcissism want their children to get ahead and stand out (Grapsas et al., 2020). They give their children uncommon first names, presumably in an attempt to make them stand out from others, and they frequently praise their children for their agentic achievements (Brummelman et al., 2015). In addition, psychophysiological research demonstrates that these parents show quick, subtle, and automatic affective responses to their child's status gains and losses—a physiological sensitivity that they presumably transfer to their children (Grapsas et al., 2021). Research should unravel these underlying socialization mechanisms.

Finally, an intriguing question is whether and how comparisons contribute socioeconomic disparities in self-views. Adolescents with higher socioeconomic status tend to have higher narcissism and self-esteem levels (Brummelman & Sedikides, 2023), perhaps because they make more downward and fewer upward social comparisons. Why? In families with higher socioeconomic status, parents tend to cultivate competitive tendencies in their children—such as by coaching them for admission interviews and engaging them in extracurricular activities centering around competition (Goudeau et al., in press). Research should examine whether this emphasis on competition can cultivate an interest in social comparison information, and whether this contributes to socioeconomic disparities in self-views.

Conclusion

Adolescence is a time when narcissism levels rise. Our work demonstrates that adolescents high in narcissism make more downward social and temporal comparisons in their everyday life. Downward social comparisons—but not downward temporal comparisons—may reinforce their narcissism levels over time. Considering the pervasiveness of social comparison opportunities in Western society, these findings highlight how cultural practices can shape adolescent development.

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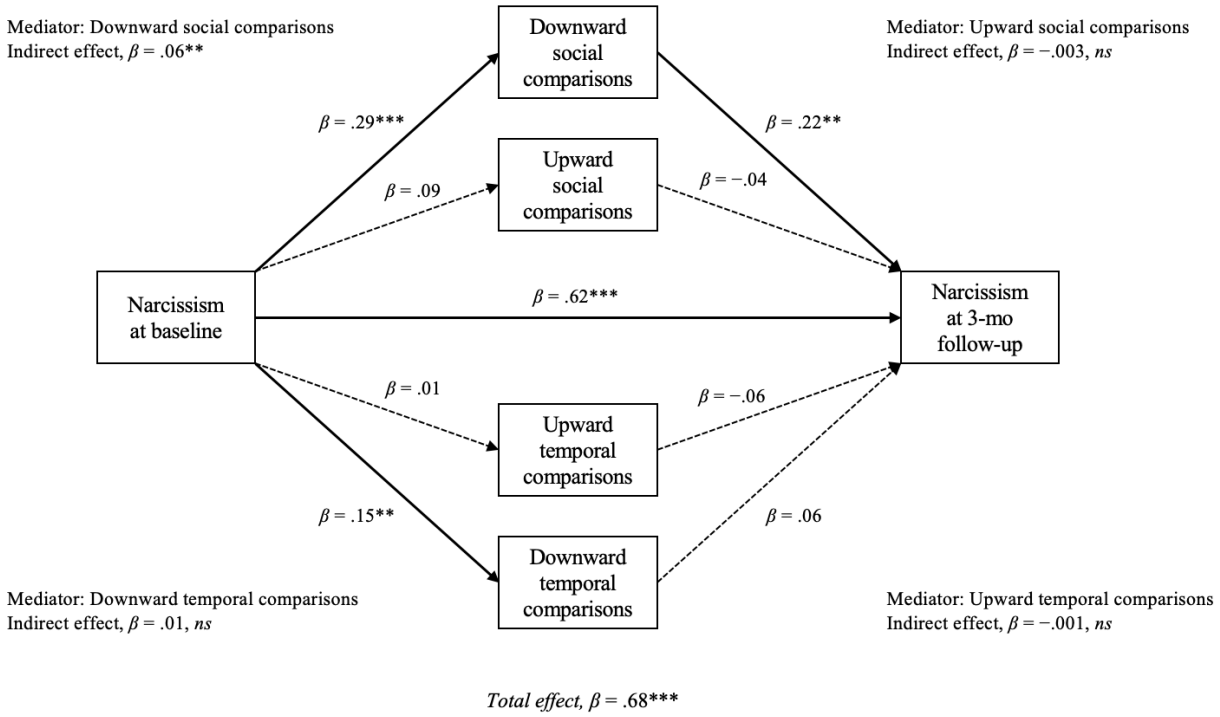
Figure 1

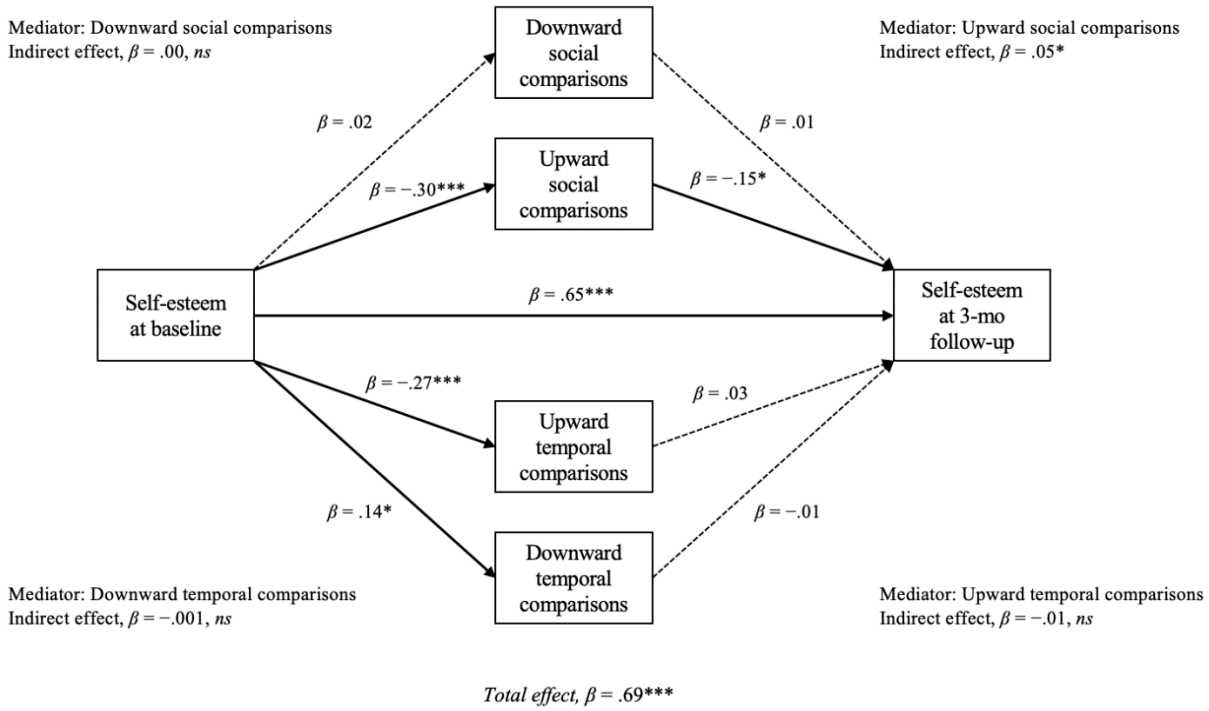
Mediational Models for Narcissism



Note. N = 388. This is the mediational model for narcissism with all comparison strategies in a single model. Covariances between comparison strategies are not shown for simplicity. Covariance (downward social comparisons, upward social comparisons) = 0.381; covariance (downward social comparisons, downward temporal comparisons) = 0.401; covariance (downward social comparisons, upward temporal comparisons) = 0.200; covariance (upward social comparisons, downward temporal comparisons) = 0.160; covariance (upward social comparisons, upward temporal comparisons) = 0.441; covariance (downward temporal comparisons, upward temporal comparisons) = 0.195, all *p*s < .005. Total effect of narcissism at baseline on narcissism at follow-up was significant (β = 0.683, *SE* = 0.061, p < .001, 95% CI [0.677, 0.915]).
*p < .05, **p < .01, *** < .001.

Figure 2

Mediational Models for Self-Esteem



Note. N = 387. This is the mediational model for self-esteem with all comparison strategies in a single model. Covariances between comparison strategies are not shown for simplicity. Covariance (downward social comparisons, upward social comparisons) = 0.423; covariance (downward social comparisons, downward temporal comparisons) = 0.426; covariance (downward social comparisons, upward temporal comparisons) = 0.218; covariance (upward social comparisons, downward temporal comparisons) = 0.237; covariance (upward social comparisons, upward temporal comparisons) = 0.405; covariance (downward temporal comparisons, upward temporal comparisons) = 0.247, all ps < .001. Total effect of self-esteem at baseline on self-esteem at follow-up was significant (β = 0.688, SE = 0.053, p < .001, 95% CI [0.658, 0.866]).
*p < .05, **p < .01, *** < .001.

Supplemental Material

Table S1

Study 1 (N = 359) Confirmatory Factor Analysis (CFA) for 6 Items from the Social and Temporal Comparison Tendencies Scale

	Downward social comparison tendencies	Upward social comparison tendencies	Downward temporal comparison tendencies	Upward temporal comparison tendencies
I often think about...				
1. I am better than my classmates.	.73			
2. I do things better than my classmates.	.84			
3. I am better at something than my classmates.	.82			
4. I am worse than my classmates.		.80		
5. I do things worse than my classmates.		.84		
6. I am worse at something than my classmates.		.81		
7. I am better than I used to be.			.73	
8. I do things better now than I used to do.			.78	
9. I am better at something than I used to do.			.73	
10. I am worse than I used to be.				.78
11. I do things worse than I used to do.				.76
12. I am worse at something than I used to do.				.84

Note. Total *N* = 382. Twenty-three adolescents, who did not complete the Social and Temporal Comparison Tendencies Scale, were missing from the principal component analysis. CFA analysis was conducted using *lavaan* package in R. Covariance paths were specified among four latent factors. Model fit indices suggest a satisfactory model fit, $\chi^2(48) = 149.298$, $p < .001$, RMSEA = .077, 90% CI [.063, .091], CFI = .948, TLI = .928, SRMR = .039.

Table S2

Study 1 (N = 382) Descriptive Statistics and Pearson Correlations between Self-views and Comparison Tendencies

	N	*M (SD)*	Age	Narcissism	Self-esteem	DSOC	USOC	DTEM
1. Age	382	12.46 (1.23)	-					
2. Narcissism	377	1.13 (0.47)	.01	-				
3. Self-esteem	377	2.23 (0.46)	-.05	.18***	-			
4. DSOC	377	0.82 (0.65)	.07	.56***	-.01	-		
5. USOC	363	0.74 (0.67)	.11*	.09+	-.53***	.24***	-	
6. DTEM	377	1.38 (0.78)	.01	.26***	-.03	.34***	.18***	-
7. UTEM	363	0.57 (0.66)	-.02	.17***	-.30***	.29***	.50***	.22***

Note. Age is reported in years. DSOC refers to downward social comparison tendencies; USOC refers to upward social comparison tendencies; DTEM refers to downward temporal comparison tendencies; UTEM refers to upward social comparison tendencies. Five adolescents had completely missing data on the variables narcissism, self-esteem, and downward social comparison tendencies, and downward temporal comparison tendencies; 19 adolescents had completely missing data on the variables upward social comparison tendencies and upward temporal comparison tendencies.
+$p < .10$, *$p < .05$, **$p < .01$ ***$p < .001$ (two-tailed).

Table S3

Study 1 (N = 382) Partial Correlations between Self-views and Comparison Tendencies, Controlling for Age and Gender

	Narcissism	Self-esteem
1. DSOC	.527***	-.061
2. USOC	.109*	-.527***
3. DTEM	.205***	-.084
4. UTEM	.170**	-.320***

Note. Age in years and gender were controlled for. Gender was dummy coded where girls=1 and boys=0. DSOC refers to downward social comparison tendencies; USOC refers to upward social comparison tendencies; DTEM refers to downward temporal comparison tendencies; UTEM refers to upward social comparison tendencies. Five adolescents had completely missing data on the variables narcissism, self-esteem, and downward social comparison tendencies, and downward temporal comparison tendencies; 19 adolescents had completely missing data on the variables upward social comparison tendencies and upward temporal comparison tendencies.
+$p < .10$, ***$p < .001$ (two-tailed).

Table S4

Study 2 (N = 389) Descriptive Statistics and Pearson Correlations between Self-views and Comparison Tendencies

	N	*M (SD)*	1	2	3	4	5	6	7	8
1. Age (in years)	389	12.69 (0.97)	-							
2. Narcissism baseline	388	1.01 (0.44)	.06	-						
3. Narcissism follow-up	201	1.02 (0.50)	.15*	.68**	-					
4. Self-esteem baseline	387	2.23 (0.51)	-.13*	.08	.01	-				
5. Self-esteem follow-up	196	2.18 (0.59)	-.13+	-.07	-.05	.72***	-			
6. DSOC	317	1.40 (0.47)	.06	.29**	.41***	.02	-.06	-		
7. USOC	317	1.34 (0.43)	.13*	.09	.07	-.30***	-.39**	.39***	-	
8. DTEM	316	2.18 (0.70)	-.10+	.15**	.21**	.14*	.04	.42***	.17**	-
9. UTEM	316	1.28 (0.39)	.12*	.01	.04	-.27***	-.20**	.20***	.45***	.20***

Note. DSOC refers to downward social comparison tendencies; USOC refers to upward social comparison tendencies; DTEM refers to downward temporal comparison tendencies; UTEM refers to upward social comparison tendencies. *+p <.10, *p* < .05, ***p* < .01, ****p* < .001 (two-tailed).

Table S5

The Mediator Role of Social and Temporal Comparisons in the Maintenance of Narcissism and Self-Esteem, Controlling for Age and Gender

	β	*p-value*	95% CI
Mediator: Downward social comparison			
Narcissism at baseline ~			
Age	0.055	.249	[-0.02 – 0.07]
Gender (Girls)	-0.209	< .001***	[-0.27 – -0.10]
Downward social comparison ~			
Narcissism at baseline (*a* path)	0.266	< .001***	[0.16 – 0.40]
Age	0.056	.309	[-0.03 – 0.08]
Gender (Girls)	-0.082	.146	[-0.180 – 0.04]
Narcissism at follow-up ~			
Narcissism at baseline (*c* path)	0.598	< .001***	[0.57 – 0.81]
Downward social comparison (*b* path)	0.208	< .001***	[0.08 – 0.36]
Age	0.077	.117	[-0.01 – 0.09]
Gender (Girls)	-0.058	.264	[-0.16 – 0.05]
Mediation effect (*ab*)	0.055	.006**	[0.02 – 0.11]
Total effect	0.654	< .001***	[0.63 – 0.87]
Mediator: Upward social comparison	*β*	*p-value*	95% CI
Narcissism at baseline ~			
Age	0.055	.236	[-0.02 – 0.07]
Gender (Girls)	-0.208	< .001***	[-0.27 – -0.09]
Upward social comparison ~			
Narcissism at baseline (*a* path)	0.110	.044*	[0.01 – 0.22]
Age	0.126	.026*	[0.01 – 0.11]
Gender (Girls)	0.132	.018*	[0.03 – 0.22]
Narcissism at follow-up ~			
Narcissism at baseline (*c* path)	0.654	< .001***	[0.62 – 0.87]
Upward social comparison (*b* path)	0.025	.671	[-0.10 – 0.17]
Age	0.077	.118	[-0.01 – 0.10]
Gender (Girls)	-0.084	.129	[-0.19 – 0.03]
Mediation effect (*ab*)	0.003	.719	[-0.01 – 0.02]
Total effect	0.657	< .001***	[0.63 – 0.88]

Table S5 (continued)

The Mediator Role of Social and Temporal Comparisons in the Maintenance of Narcissism and Self-Esteem, Controlling for Age and Gender

	β	*p-value*	95% CI
Mediator: Downward temporal comparison			
Narcissism at baseline ~			
Age	0.055	.238	[-0.02 – 0.07]
Gender (Girls)	-0.209	< .001***	[-0.27 – -0.10]
Downward temporal comparison ~			
Narcissism at baseline (*a* path)	0.134	.024*	[0.03 – 0.40]
Age	-0.108	.043*	[-0.15 – -0.00]
Gender (Girls)	-0.089	.116	[-0.28 – 0.04]
Narcissism at follow-up ~			
Narcissism at baseline (*c* path)	0.641	< .001***	[0.62 – 0.86]
Downward temporal (*b* path)	0.121	.053+	[-0.00 – 0.18]
Age	0.093	.057+	[0.00 – 0.10]
Gender (Girls)	-0.069	.191	[-0.18 – 0.04]
Mediation effect (*ab*)	0.016	.170	[-0.00 – 0.05]
Total effect	0.657	< .001***	[0.65 – 0.88]
Mediator: Upward temporal comparison	*β*	*p-value*	95% CI
Narcissism at baseline ~			
Age	0.055	.222	[-0.01 – 0.07]
Gender (Girls)	-0.208	< .001***	[-0.27 – -0.09]
Upward temporal comparison ~			
Narcissism at baseline (*a* path)	0.045	.399	[-0.05 – 0.14]
Age	0.123	.026*	[0.01 – 0.09]
Gender (Girls)	0.165	.002**	[0.05 – 0.22]
Narcissism at follow-up ~			
Narcissism at baseline (*c* path)	0.659	< .001***	[0.62 – 0.90]
Upward temporal comparison (*b* path)	-0.009	.882	[-0.15 – 0.17]
Age	0.078	.127	[-0.01 – 0.10]
Gender (Girls)	-0.076	.180	[-0.19 – 0.04]
Mediation effect (*ab*)	-0.000	.924	[-0.01 – 0.01]
Total effect	0.659	< .001***	[0.62 – 0.90]

Table S5 (continued)

The Mediator Role of Social and Temporal Comparisons in the Maintenance of Narcissism and Self-Esteem, Controlling for Age and Gender

	β	*p-value*	95% CI
Mediator: Downward social comparison			
Self-esteem at baseline ~			
Age	-0.133	.015*	[-0.13 – -0.02]
Gender (Girls)	-0.138	.006**	[-0.25 – -0.04]
Downward social comparison ~			
Self-esteem at baseline (*a* path)	0.012	.834	[-0.09 – 0.12]
Age	0.066	.248	[-0.02 – 0.09]
Gender (Girls)	-0.135	.015*	[-0.23 – -0.03]
Self-esteem at follow-up ~			
Self-esteem at baseline (*c* path)	0.675	< .001***	[0.64 – 0.86]
Downward social comparison (*b* path)	-0.047	.423	[-0.20 – 0.09]
Age	-0.104	.055+	[-0.13 – -0.00]
Gender (Girls)	-0.064	.239	[-0.20 – 0.05]
Mediation effect (*ab*)	-0.001	.891	[-0.01 – 0.01]
Total effect	0.674	< .001***	[0.64 – 0.86]
Mediator: Upward social comparison	*β*	*p-value*	95% CI
Self-esteem at baseline ~			
Age	-0.132	.008**	[-0.12 – -0.02]
Gender (Girls)	-0.137	.008**	[-0.25 – -0.04]
Upward social comparison ~			
Self-esteem at baseline (*a* path)	-0.274	< .001***	[-0.33 – -0.14]
Age	0.097	.074+	[-0.00 – 0.09]
Gender (Girls)	0.074	.157	[-0.03 – 0.15]
Self-esteem at follow-up ~			
Self-esteem at baseline (*c* path)	0.636	< .001***	[0.60 – 0.82]
Upward social comparison (*b* path)	-0.129	.035*	[-0.34 – -0.02]
Age	-0.104	.054+	[-0.13 – -0.00]
Gender (Girls)	-0.044	.396	[-0.17 – 0.06]
Mediation effect (*ab*)	0.035	.063+	[0.00 – 0.09]
Total effect	0.671	.000***	[0.65 – 0.85]

Table S5 (continued)

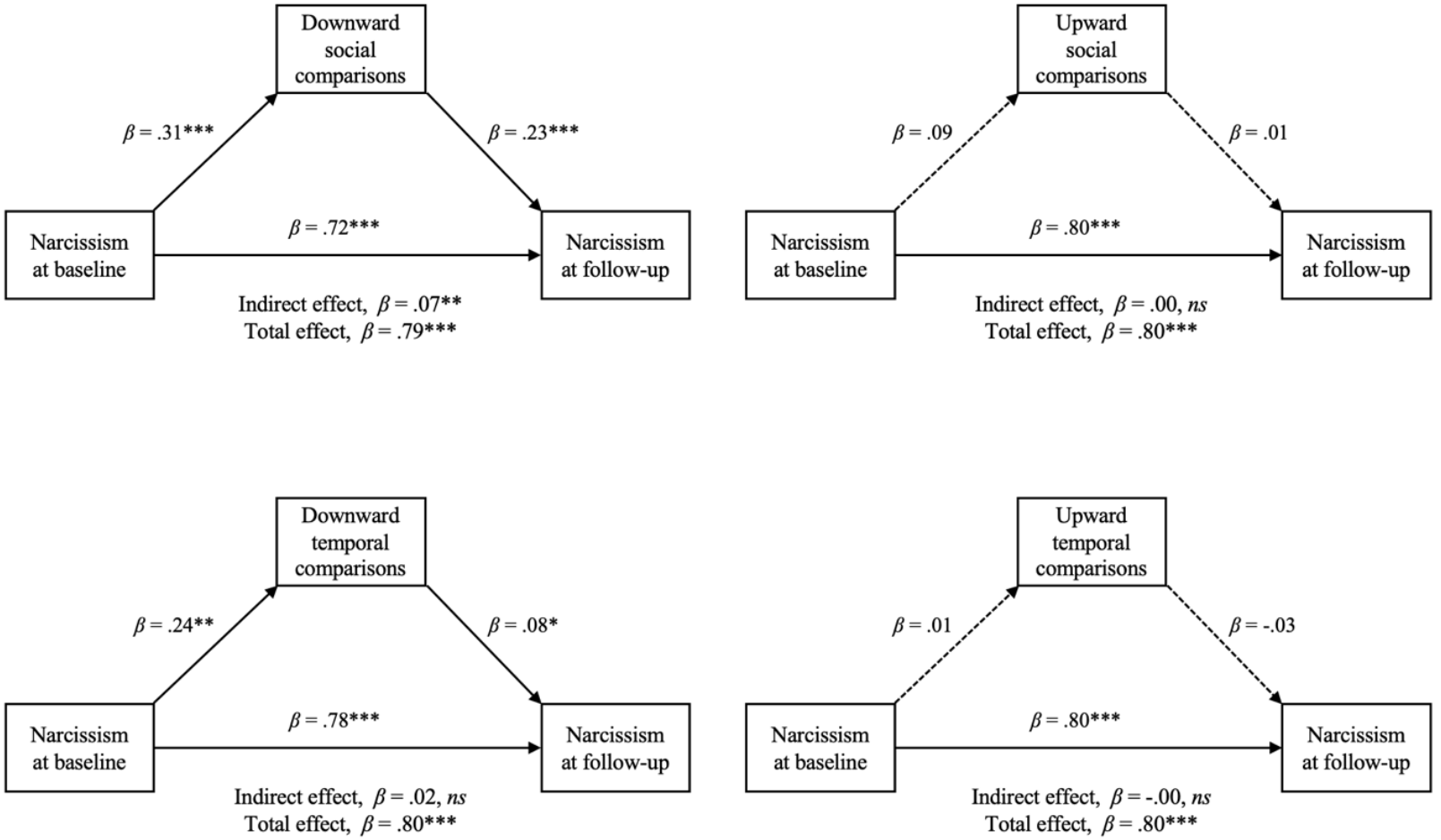
The Mediator Role of Social and Temporal Comparisons in the Maintenance of Narcissism and Self-Esteem, Controlling for Age and Gender

	β	*p-value*	95% CI
Mediator: Downward temporal comparison			
Self-esteem at baseline ~			
Age	-0.133	.010*	[-0.12 – -0.02]
Gender (Girls)	-0.138	.009**	[-0.25 – -0.03]
Downward temporal comparison ~			
Self-esteem at baseline (*a* path)	0.111	.040*	[0.00 – 0.30]
Age	-0.089	.095+	[-0.14 – 0.01]
Gender (Girls)	-0.102	.063+	[-0.31 – 0.00]
Self-esteem at follow-up ~			
Self-esteem at baseline (*c* path)	0.680	< .001***	[0.65 – 0.86]
Downward temporal comparison (*b* path)	-0.047	.417	[-0.13 – 0.05]
Age	-0.111	.040*	[-0.13 – -0.00]
Gender (Girls)	-0.060	.254	[-0.07 – -0.06]
Mediation effect (*ab*)	-0.005	.493	[-0.03 – 0.01]
Total effect	0.675	< .001***	[0.64 – -0.86]
Mediator: Upward temporal comparison	*β*	*p-value*	95% CI
Self-esteem at baseline ~			
Age	-0.133	.012*	[-0.13 – -0.02]
Gender (Girls)	-0.138	.007**	[-0.24 – -0.04]
Upward temporal comparison ~			
Self-esteem at baseline (*a* path)	-0.241	< .001***	[-0.26 – -0.11]
Age	0.094	.079+	[-0.00 – 0.08]
Gender (Girls)	0.125	.023*	[0.01 – 0.18]
Self-esteem at follow-up ~			
Self-esteem at baseline (*c* path)	0.672	< .001***	[0.62 – 0.86]
Upward temporal comparison (*b* path)	-0.016	.788	[-0.21 – 0.12]
Age	-0.106	.053+	[-0.13 – -0.00]
Gender (Girls)	-0.054	.283	[-0.17 – 0.06]
Mediation effect (*ab*)	0.004	.795	[-0.02 – 0.04]
Total effect	0.676	< .001***	[0.64 – 0.86]

Note. Bootstrapping with n=1,000 iterations; Age in years and Gender (1 = Girls; 0 = Boys); *a* path = direct effect of self-views at baseline on comparison types; *b* path = direct effect of comparison types on self-views at follow-up; *c* path = direct effect of self-views at baseline on self-views at follow-up.

Figure S1

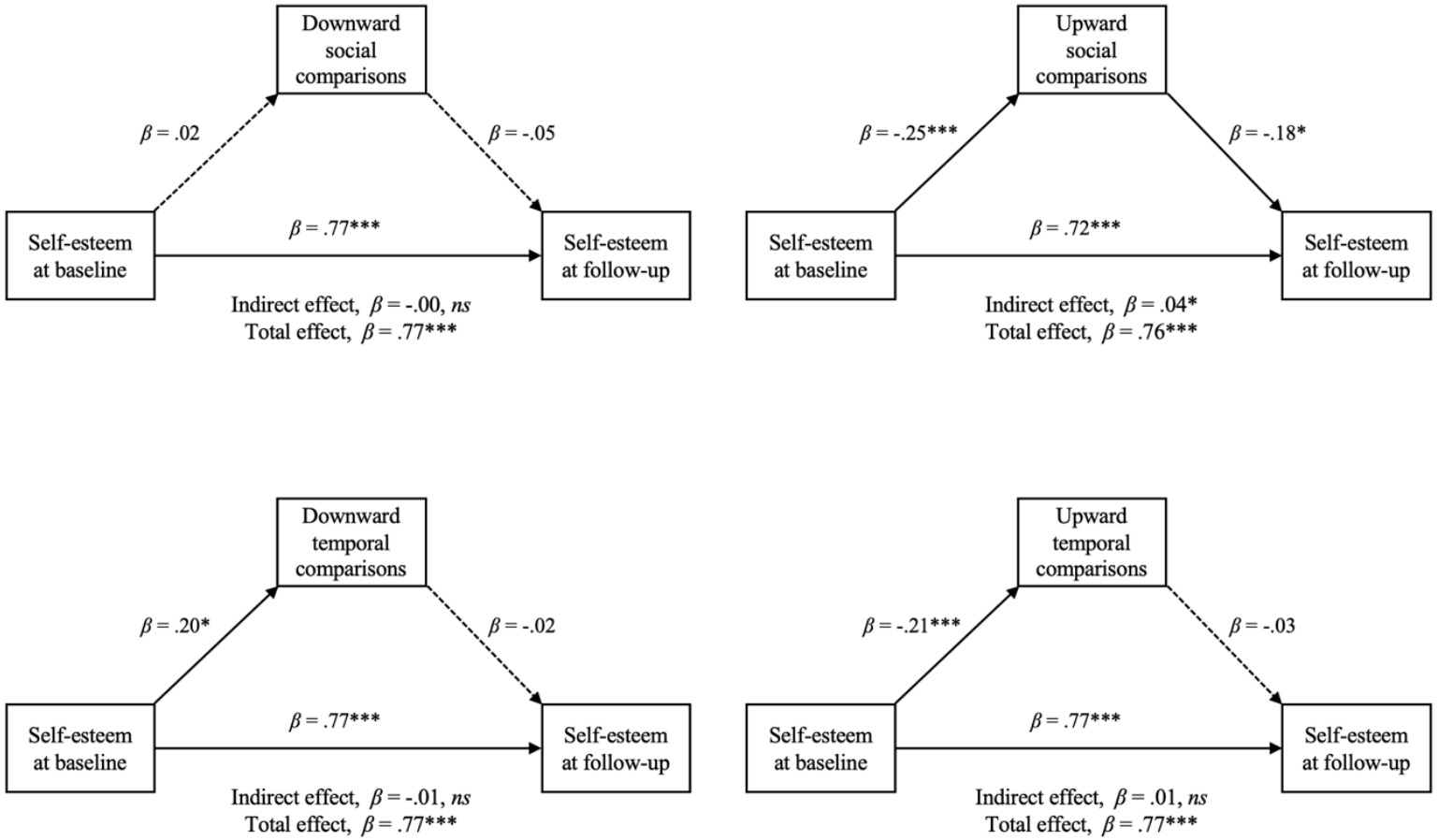
Individual Mediational Models for Narcissism



Note. *$p < .05$, **$p < .01$, ***$p < .001$.

Figure S2

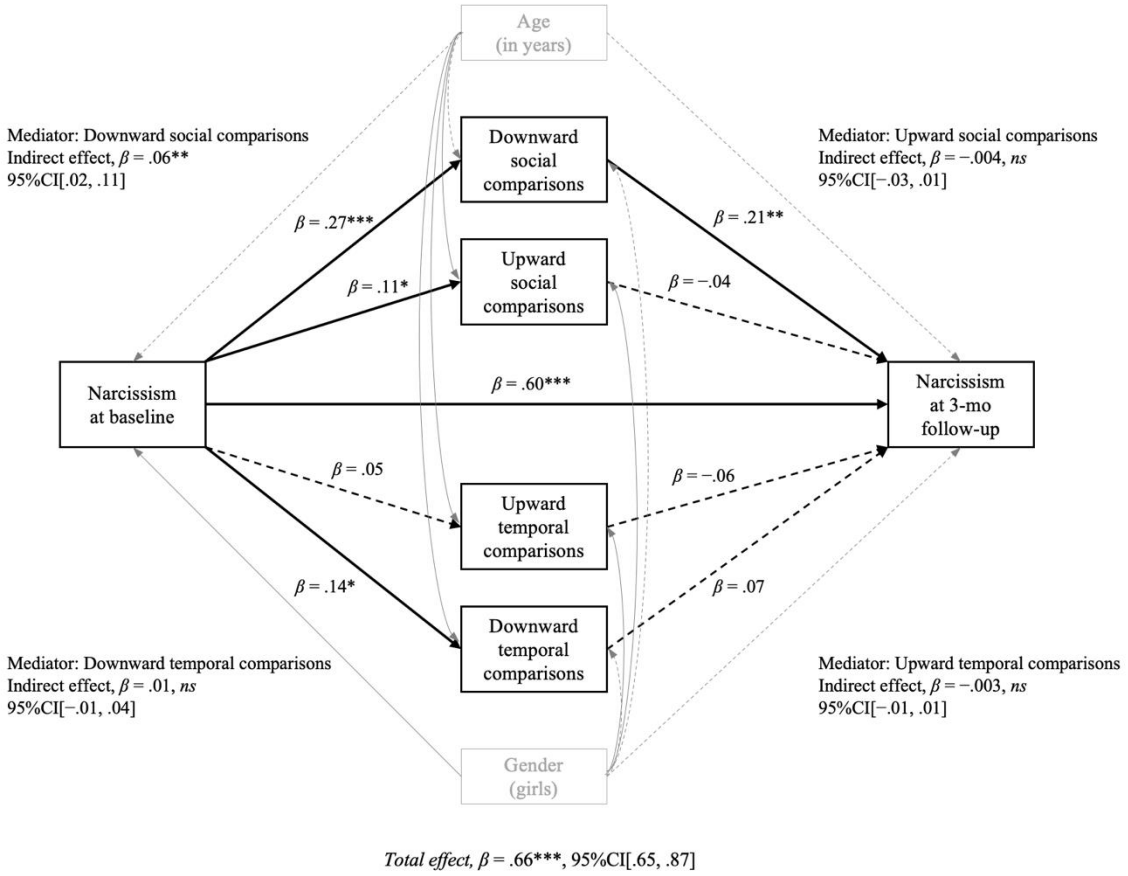
Individual Mediational Models for Self-Esteem



Note. *$p < .05$, **$p < .01$, ***$p < .001$.

Figure S3

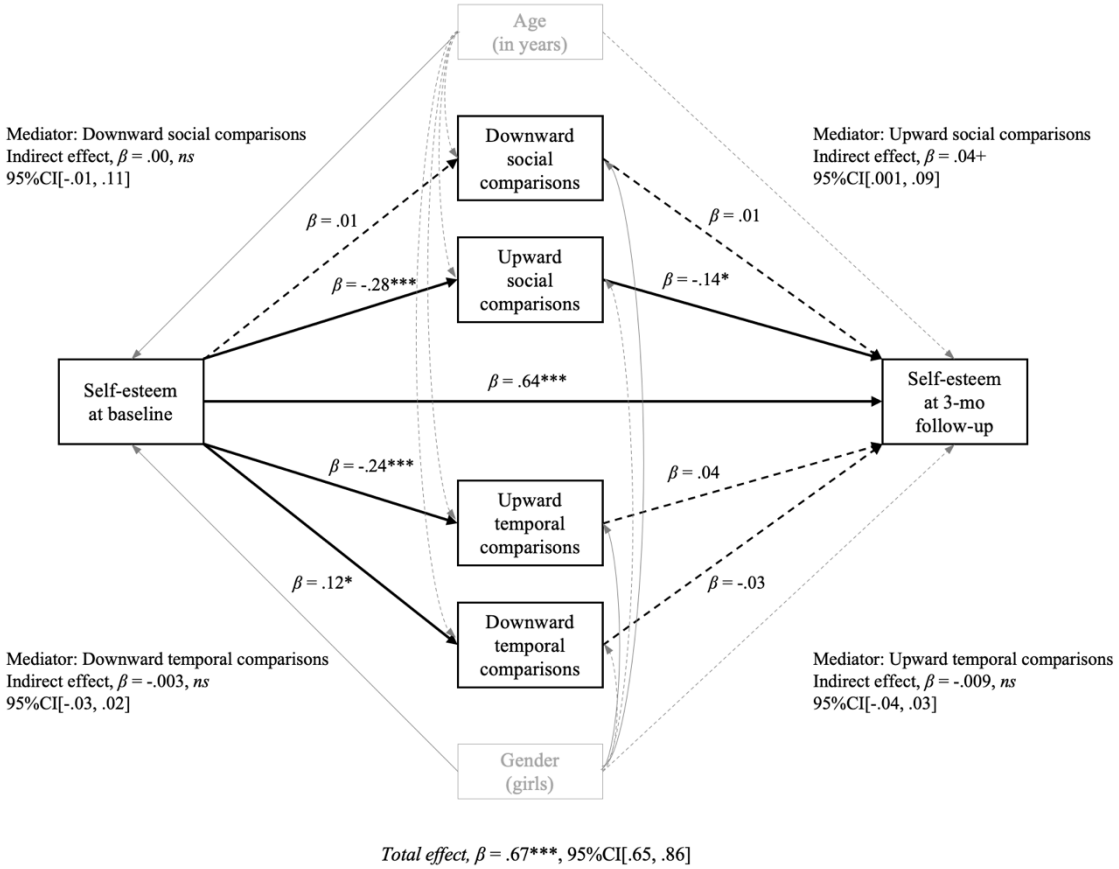
Mediational Models for Narcissism Controlling for Covariates (Age and Gender)



Note: Age in years and gender were controlled for. Gender was dummy coded where girls = 1 and boys = 0. Regression paths controlling for covariates are denoted with gray color. Solid gray lines indicate significant relationships at $p < .05$. Dashed gray lines indicate non-significant relationships at $p > .10$. *$p < .05$, **$p < .01$, ***$p < .001$.

Figure S4

Mediational Models for Self-Esteem Controlling for Covariates (Age and Gender)



Note: Age in years and gender were controlled for. Gender was dummy coded where girls = 1 and boys = 0. Regression paths controlling for covariates are denoted with gray color. Solid gray lines indicate significant relationships at p <.05. Dashed gray lines indicate non-significant relationships at p >.10. +p <.10, *p < .05, **p < .01, ***p < .001.