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EMPIRICAL RESEARCH

Identity Formation, Body Image, and Body-Related Symptoms: Developmental Trajectories and Associations Throughout Adolescence

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Abstract

Emerging evidence highlights the intricate link between identity and one's body, however, integrative longitudinal research on this identity-body interplay is lacking. The current study used three-wave longitudinal data (Time 1: $N = 403$; 52.1% female; $M_{age} = 14.85$, $SD = 0.89$, range = 13–19 years) spanning two years (2019–2021; T1 and T2 being pre-pandemic, T3 peri-pandemic) to identify identity trajectory classes and examine their co-development with negative and positive body image and various body-related variables (i.e., sociocultural pressures, internalization of appearance ideals, self-objectification, appearance comparison, and eating disorder symptoms). First, four identity classes emerged using latent class growth analysis (achievement, moratorium, carefree diffusion, and troubled diffusion). Second, using multigroup latent growth curve modeling, adolescents in less adaptive identity trajectory classes (i.e., engaging less in pro-active processes and more in ruminative processes) displayed higher levels of negative body image and body-related symptoms. The current study testified to the clinically meaningful associations linking identity formation to adolescents' body image and other body-related symptoms.

Keywords Identity functioning · Body image · Adolescence · Trajectory classes

Introduction

Identity formation is a lifelong developmental task which is especially prominent during adolescence and emerging adulthood (Erikson, 1968). Erikson has already mentioned that feeling at home in one's body is one of the most important concomitants of achieving an optimal identity. In the past few years, research has pointed to the intricate link between identity functioning and one's body. However, integrative research is lacking as research on personal identity and one's body has developed mainly in isolation (Nelson et al., 2018). Further, research has mainly focused on negative body image instead of adopting a holistic perspective on the body with attention to positive body image as well. To broaden the understanding of the link between identity and one's body, the current study used three-wave longitudinal data spanning two years to (1) identify different identity trajectory classes (based on five interrelated commitment and exploration-processes) among adolescents and examine if these trajectory classes differ on gender, age, and body mass index (BMI) at baseline; and (2) examine how these identity trajectory classes are related to differential development in negative and positive body image and various body-related variables and symptoms (i.e., sociocultural pressures and internalization of appearance ideals, self-objectification, appearance comparison, and eating disorder symptoms).

Identity Formation

Erikson (1968) described identity formation as a central developmental task throughout the life span. Especially during adolescence and emerging adulthood, youth are challenged to resolve life-defining questions. During this

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identity quest, adolescents may go through an identity crisis in which they contemplate decisions concerning their future lives. This identity crisis may result in identity synthesis which is characterized by adhering to a set of coherent ideals and future goals, or alternatively, in sustained feelings of identity confusion in which a sense of purpose is lacking (Erikson, 1968).

To operationalize Erikson's ideas on identity formation, the identity status paradigm was proposed by Marcia (1966) to identify behavioral markers of one's underlying identity structure. Marcia focused on the decision-making processes of exploration (of different identity alternatives) and commitment (adhering to one or more identity alternatives). Marcia derived four identity statuses based on the levels of engagement in exploration and commitment: achievement (characterized by high commitment after high exploration), foreclosure (characterized by high commitment but without prior exploration), moratorium (high exploration and low commitment), and diffusion (low commitment and low exploration).

Due to societal changes in Western societies (e.g., prolonged education), young people may postpone long-term identity commitments (Arnett, 2000). Consequently, identity formation has been extended into emerging adulthood as individuals re-evaluate their prior commitments. These societal changes call for a rethinking of existing models. Luyckx et al., 2008 developed a dynamic process-oriented identity model with five processes to capture identity formation. According to this model, the search for one's identity may start with a broad exploration of various identity alternatives (*exploration in breadth*), presumably followed by making identity choices (*commitment making*). Afterwards, these identity choices may be evaluated in-depth by discussing them with significant others or by considering personal values and standards (*exploration in depth*). Exploration in depth may result in *identification with commitments*, as the individual feels convinced about their commitments, or alternatively, the process can cycle back to renewed exploration if the individual does not identify with the commitments. However, some individuals continue to explore without engaging into long-term commitments and get stuck in their identity search. As such, this model distinguishes pro-active exploration (in breadth and in depth) from *ruminative exploration* which inhibits achieving a stable identity.

By using person-centered techniques on longitudinal data emerging from the dynamic process-oriented identity model, different identity trajectory classes resembling Marcia's identity statuses could be identified. The advantage of this typological approach is that researchers could gain insight into subgroups of individuals, both those who are more resilient in their identity quest and those who experience more difficulties and are more vulnerable over time. This approach has already been used in community samples of adolescents (12–18 years at baseline), college students (17–29 years at baseline), and employees (21–40 years at baseline). Five identity trajectory classes have been consistently identified: achievement, foreclosure, moratorium, carefree diffusion, and troubled diffusion (Luyckx et al., 2013; Raemen et al., 2022). As expected, across studies, individuals in the achievement class displayed high scores on all identity processes, except for low scores on ruminative exploration. Individuals in the foreclosure class scored moderate to high on commitment processes (not as high as achievement) and low on all exploration processes. Individuals in the moratorium class scored low to moderate on commitment processes, and high on exploration processes. Individuals in the carefree diffusion class displayed low scores on commitment and pro-active exploration processes and moderate to low scores on ruminative exploration. Individuals in the troubled diffusion class scored low on commitment processes, low to moderate on exploration in depth and in breadth, and high on ruminative exploration. These identity trajectory classes were mainly based on consistent differences in initial levels of commitment and exploration processes (i.e., intercepts) and less so in rates of changes over time (i.e., slopes), as differences in slopes were less indicative to differentiate trajectory classes in a specific sample. Furthermore, previous studies have found significant differences in gender and age between the trajectory classes. With regard to gender, girls were more likely to be situated in statuses characterized by higher scores on pro-active and ruminative exploration processes (i.e., moratorium and troubled diffusion), whereas boys were more likely to be situated in statuses characterized by lower scores on exploration processes (i.e., foreclosure and carefree diffusion) (Raemen et al., 2022; Verschueren et al., 2017). With regard to age, older individuals were more likely to be situated in statuses characterized by higher levels of both commitment and pro-active exploration processes (i.e., especially achievement) (Raemen et al., 2022; Verschueren et al., 2017).

Given that the search for a personal identity can be accompanied by certain challenges and difficulties, the COVID-19 pandemic and its vast impact on everyday life may have made this developmental task even more demanding. Research worldwide has investigated adolescents' mental health in relation to the pandemic and testified to the serious negative outcomes adolescents were confronted with (Jones et al., 2021). These studies have emphasized the specific vulnerability of adolescents, given that they are faced with the challenging task of constructing a personal identity. Given that one's identity develops in close interaction with the social context and peers become increasingly important during this developmental stage, adolescents are highly sensitive to social

interactions (Erikson, 1968; McElhaney et al., 2008). As such, adolescents' mental health and their identity formation process could have been affected by the social isolation measures imposed during the pandemic (Cover, 2021).

Identity and the Body

Besides the process of identity formation, adolescents' bodies undergo a range of apparent changes (Wertheim & Paxton, 2012). Adolescents go through these maturation processes whilst the opinion of others and social acceptation by peers becomes increasingly important (McElhaney et al., 2008). This may result in a heightened consciousness of the body and appearance, becoming a central aspect of adolescents' lives. As a result, the prevalence of youth struggling with a negative body image is alarmingly high (Bucchianeri et al., 2013). Given that identity formation and body image both come to the fore during adolescence and emerging adulthood, theorists call for an increasing integration of both research fields (Daniels & Gillen, 2015). The current study aims to investigate the associations between identity and a range of interrelated body-related variables and processes that have been forwarded in multifactorial models such as Stice's (2001) dual-pathway model. More specifically, in the current study, identity formation will be linked to the body perfect ideal upheld in society and the sociocultural pressures individuals may experience in attaining these ideals, the processes of self-objectification and appearance comparison, and, finally, body image and disturbed eating behaviors.

An important contributor to negative body image is the, often unrealistic, *body perfect ideal* youth are confronted with, typically encouraging girls to be thin and boys to be lean and muscular (Dittmar et al., 2007; Slater et al., 2012). These body perfect ideals are communicated through *sociocultural pressures* (e.g., media, parents, and peers), which may result in the *internalization of appearance ideals* (Thompson et al., 1999; Thompson & Stice, 2001). In the past years, research from various theoretical frameworks, such as the identity disruption model (Vartanian et al., 2018) and the identity styles model (Berzonsky, 1988), has revealed that identity formation in youth may impact the vulnerability to turn to appearance ideals. The identity disruption model linked negative early life experiences to body dissatisfaction and disordered eating via self-concept clarity (a concept closely related to identity diffusion) and sociocultural pressures. Results indicated that lower self-concept clarity was associated with higher internalization of appearance ideals and more frequent appearance comparisons, which were associated with greater body dissatisfaction. Greater body dissatisfaction, in turn, was associated with higher levels of disordered eating. From this perspective, individuals with low self-concept clarity are thought to be more vulnerable to turn to external sources to derive a sense of self (Vartanian et al., 2018). Relatedly, research from the identity styles framework indicated that adolescents who attach more importance to expectations and norms in their environment (i.e., the normative identity style) seemed more vulnerable to develop a rather maladaptive attitude towards beauty and eating. In contrast, adolescents who were information-oriented and engaged in pro-active identity exploration seemed to distance themselves from body perfect ideals and were therefore less vulnerable to internalizing these appearance ideals. In other words, individuals who actively search for information and are critical towards their environment (i.e., the information-oriented identity style) seemed less likely to turn to externally oriented identity building blocks which are provided by society (Verstuyf et al., 2014). In line with these findings, researchers have already stated that a healthy identity development may fulfill a protective role against appearance ideals internalization (Corning & Heibel, 2016).

Internalization of appearance ideals may lead to *self-objectification*, a self-perspective in which you look at your own body as an object and evaluate yourself based on its appearance (Lindner & Tantleff-Dunn, 2017). Previous findings demonstrated that self-objectification is a risk factor for various negative outcomes including body shame, body dissatisfaction, appearance anxiety, and disordered eating (Tiggemann, 2011). Little is known about the interplay between self-objectification and identity formation (Daniels & Gillen, 2015). However, theorists presume that self-objectified individuals may choose appearance-related identity alternatives, which may impact one's choices concerning leisure activities (e.g., dance, gymnastics,…), education and profession (e.g., fashion, hostess job, hairdresser,…) (Calogero, 2011).

Self-objectification was found to be bidirectionally associated with *appearance comparison* (Lindner et al., 2012; Tylka & Sabik, 2010), a process in which adolescents compare their appearance to the appearance of others as a way to evaluate themselves (Festinger, 1954). As mentioned earlier, the identity disruption model indicated that individuals with low self-concept clarity were more susceptible to engage more frequently in appearance comparison to define their sense of self, which has been confirmed in other studies as well (Shahyad et al., 2018; Vartanian et al., 2018). When adolescents compare themselves to idealized media images or peers who are thought to be more attractive, appearance comparison may lead to negative outcomes, such as a negative body image (Yang et al., 2018). *Negative body image* is primarily characterized by body image disturbance (Burychka et al., 2021). Body image disturbance can be manifested in an underestimation or overestimation of body size (i.e., perceptual disturbance)

and/or body dissatisfaction or overevaluation of body size and weight (i.e., affective disturbance) (Cornelissen et al., 2013; Dakanalis et al., 2016). However, body image is a multidimensional concept covering both negative and positive body image (Burychka et al., 2021). *Positive body image* was initially understood as the opposite concept of negative body image (Smolak, 2012; Tylka, 2012). However, a growing body of evidence points out that negative and positive body image are two distinct constructs (Tylka, 2018). Positive body image covers acceptance, respect, and favorable opinions towards one's own body despite incongruences with media-promoted appearance ideals (Tylka & Wood-Barcalow, 2015a).

During the past decade, there has been a growing interest in the interplay between identity and body image (Daniels & Gillen, 2015). Erikson (1968) has already highlighted the intricate link between identity and one's body in adolescence. During this developmental stage, the focus on one's body and appearance may be so strong that it becomes a central identity aspect (Arnett, 2000). In line with this theorizing, recent studies have confirmed the salience of one's body to define oneself as a person (Kling et al., 2018). One of the initial studies demonstrated a positive relationship between identity distress and negative body image (Kamps & Berman, 2011). Studies in adolescents revealed a positive association between identity processes (interpersonal exploration and commitment processes) and body esteem (Wängqvist & Frisén, 2013). Furthermore, decreasing body esteem predicted lowered identity coherence in emerging adulthood over time (Nelson et al., 2018). Further, identity functioning predicted body dissatisfaction over time, whereas body dissatisfaction also predicted maladaptive identity functioning over time (Palmeroni et al., 2020; Verschueren et al., 2018). Questions concerning the association between identity and positive body image, however, remain largely unanswered, indicating the need to address this topic.

Finally, negative body image is known to be a key element in the onset and maintenance of *eating disorder symptoms*, such as drive for thinness and bulimia (binge eating, purging) (Shagar et al., 2017). Eating disorder symptoms are highly prevalent in adolescence and contribute to the development and maintenance of clinical eating disorders (Croll et al., 2002). Theorists have forwarded identity formation as a contributing factor in the development and maintenance of eating disorder symptoms. Individuals searching for one's identity may turn to eating disorder symptoms to define themselves, what may result in a more fragile identity (Corning & Heibel, 2016). Consequently, when the body is used to derive a sense of identity, this may result into the continuation of eating disorder symptoms to maintain this fragile personal identity (Cunningham et al., 2016; Verschueren et al., 2019). Otherwise, eating disorder symptomatology may also represent avoidance strategies to deal with identity-related difficulties (Wheeler et al., 2001). In a recent study, community adolescents who committed to their identity choices reported lower levels of drive for thinness and bulimia (Raemen et al., 2022). Previous studies in community adolescents further indicated that experiencing identity problems was associated with increased drive for thinness and bulimia (Palmeroni et al., 2020; Vartanian et al., 2018). Relatedly, patients with an eating disorder reported more identity problems compared to community controls (Verschueren et al., 2017). Furthermore, researchers have found an increasing amount of evidence for bidirectional effects between identity formation and eating disorder symptomatology (Palmeroni et al., 2021; Verschueren et al., 2019). In sum, identity formation and eating disorder symptomatology seem to reciprocally influence each other.

Current Study

Despite the fact that identity formation and body image both come to the fore during adolescence, integrative longitudinal research on this identity-body interplay in adolescents is lacking. The current study aimed to fill this gap by investigating the role of identity towards the body in adolescent boys and girls over time. The hypotheses and analyses of this study were preregistered at Open Science Framework. The first main goal was to investigate if the different identity trajectory classes that were found in previous studies could be replicated in the current study. Subsequently, since previous studies have found gender and age differences in identity formation, the current study explored whether there were gender and age differences among adolescents in different identity trajectory classes. Additionally, as drastic bodily changes and related weight change are prominent during adolescence, this study investigated if adolescents in different identity trajectory classes also differed on adjusted BMI at baseline. Second, this study aimed to investigate how these identity trajectory classes were related to differential development in negative and positive body image and various body-related variables (i.e., sociocultural pressures and internalization of appearance ideals, self-objectification, appearance comparison, and eating disorder symptoms).

Methods

Participants

A total of 403 students (52.1% female), with a mean age of 14.85 years ($SD = 0.89$; range 13–19) participated at Time

1. At Time 2, 329 students participated (retention rate = 81.64%); and at Time 3, 138 students participated (retention rate = 34.24%). Times 1 and 2 (early 2019 and, 2020, respectively) took place prior to the COVID-19 pandemic, Time 3 (early 2021) during the pandemic. Participants with and without complete data were compared using Little's (1988) Missing Completely At Random (MCAR) test including all study variables at all three time-points simultaneously, which indicated that data were most likely missing completely at random ($\chi^2 = 800.49$; $p = 0.73$). With regard to the preliminary analyses conducted in SPSS, The Expectation-Maximization (EM) algorithm was used to estimate missing data. With regard to the primary analyses conducted in MPLUS, the full information maximum likelihood (FIML) procedure (Muthén & Muthén, 2012) was used to handle cases with missing values (Enders, 2010).

Procedure

The data used in the current study were obtained in a longitudinal questionnaire study which was conducted at three annual measurement points between February 2019 and May 2021. The study was approved by the Social and Societal Ethics Committee of KU Leuven. Originally, students from four secondary schools in Flanders (Belgium) participated in the study, but data from only one school were used for the current paper, as the data collection in the other schools was not performed at all three measurement waves for logistic reasons and due to the COVID-19 pandemic. Prior to the data collection, all participants signed an informed consent form after receiving active parental consent which was required for minor participants. At Times 1 and 2, the data collection was conducted during school hours. All students filled out the self-report questionnaires and returned their completed questionnaires in a sealed envelope. Participants who were absent from school at the time of data collection were invited by e-mail to complete the questionnaires online (Qualtrics). At Time 3, data collection was done online using Qualtrics given that researchers were not allowed to collect data in schools due to the COVID-19 pandemic. At Times 2 and 3, students who had graduated or changed schools were also contacted by e-mail to participate online. Participants could win a voucher or a cinema ticket for their participation.

Measures

Adjusted body mass index

Based on students' self-reported height and weight, their BMI (weight in kilogram/height*height in meters) was calculated. Given that the sample mainly included high school students under the age of 18 years, the adjusted BMI [(BMI/Percentile 50 of BMI for age and gender) × 100] was calculated based on the growth charts of a representative Flemish sample, to account for age and gender in the interpretation of BMI-scores.

Identity

Identity processes were assessed with the 25-item Dimensions of Identity Development Scale (DIDS; Luyckx et al., 2008). This questionnaire includes five subscales (exploration in breadth, exploration in depth, ruminative exploration, commitment making, and identification with commitment), each being measured by five items. All items were rated on a 5-point rating scale, ranging from 1 (*completely disagree*) to 5 (*completely agree*), and for each dimension mean scores were used. Example items are: 'I think about the direction I want to take in my life' (exploration in breadth), 'I think about the future plans I have made' (exploration in depth), 'I keep looking for the direction I want to take in my life' (ruminative exploration), 'I decided on the direction I want to follow in life' (commitment making), and 'My plans for the future offer me a sense of security' (identification with commitment). Cronbach's alpha's at Times 1, 2, and 3 were 0.83, 0.85, and 0.83, respectively, for exploration in breadth, 0.75, 0.82, and 0.78 for exploration in depth, 0.82, 0.85, and 0.82 for ruminative exploration, 0.88, 0.91, and 0.96 for commitment making, and 0.86, 0.88, and 0.88 for identification with commitment.

Body image

Negative body image or body dissatisfaction was evaluated by the body dissatisfaction subscale of the Eating Disorder Inventory-3 (EDI-3; Garner, 2004), which gives an indication of the degree to which an individual feels unsatisfied with his/her own body shape and believes that certain body areas are too large or big. The scale consists of 9 items that were rated on a 6-point Likert scale ranging from 1 (*never*) to 6 (*always*). An example item is: 'I think that my stomach is too big'. Cronbach's alpha's were 0.90, 0.90, and 0.91 at Times 1, 2, and 3 respectively. Positive body image was assessed with the Body Appreciation Scale-2 (BAS-2; Tylka & Wood-Barcalow, 2015a). Positive body image entails favorable opinions towards one's body, acceptance of one's body despite incongruences with body perfect ideals, body competence, and integrity and respect towards the body (Tylka & Wood-Barcalow, 2015a). This scale consists of 10 items, which were rated on a 5-point Likert-scale ranging from 1 (*never*) to 5 (*always*). An example item is: 'I respect my body'. Cronbach's alpha's at Times 1, 2, and 3 were 0.92, 0.94, and 0.94, respectively.

Sociocultural pressures and internalization of societal appearance ideals

Sociocultural pressures and internalization processes were assessed with the 22-item Sociocultural Attitudes Towards Appearance Questionnaire-4 (SATAQ-4; Schaufer et al., 2015). The questionnaire includes five subscales, of which three subscales address the perceived appearance pressures from family, parents and media and two subscales address internalization of societal appearance ideals: internalization of the thin ideal and internalization of the muscular ideal. Each of the first three subscales consists of four items scored on a 5-point Likert scale ranging from 1 (*definitely disagree*) to 5 (*definitely agree*). Each of the last two subscales consists of 5 items, rated on a 5-point Likert scale ranging from 1 (*definitely disagree*) to 5 (*definitely agree*). The current study focused on the total scale score of the first three subscales, representing sociocultural pressures in general, and distinct scale scores for internalization of appearance ideals. Example items are: 'I feel pressure from my peers to improve my appearance' (sociocultural pressures), 'I want my body to look very thin' (internalization of the thin ideal), and 'It is important for me to look athletic' (internalization of the muscular ideal). Cronbach's alpha's at Times 1, 2, and 3 were 0.90, 0.89, and 0.91, respectively, for sociocultural pressures, 0.90, 0.90, and 0.93 for internalization of the thin ideal, and 0.91, 0.90, and 0.90 for internalization of the muscular ideal.

Self-objectification

The process of self-objectification was measured by the Self-Objectification Beliefs and Behaviors Scale (SOBBS; Lindner & Tantleff-Dunn, 2017), which gives an indication of the degree to which an individual internalizes an observer's perspective on the body and values the appearance of the body over physical abilities and what one thinks and feels. The scale consists of 14 items that were rated on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). An example item is: 'Looking attractive to others is more important to me than being happy with who I am inside'. Cronbach's alpha's at Times 1, 2, and 3 were 0.91, 0.91, and 0.92, respectively.

Appearance comparison

The process of appearance comparison was evaluated by the five-item Physical Appearance Comparison Scale (PACS; Thompson et al., 1991). Items were rated on a 5-point Likert scale ranging from 1 (*never*) to 5 (*always*). An example item is: 'At parties or other social events, I compare my physical appearance to the physical appearance of others'. Cronbach's alpha's were 0.80, 0.77, and 0.80 at Times 1, 2, and 3, respectively.

Eating disorder symptoms

Drive for thinness and bulimia were measured by means of the Eating Disorder Inventory-3 (EDI-3; Garner, 2004), which is a valid and reliable survey for questioning eating disorder symptomatology in non-clinical populations (Van Strien & Ouwens, 2003). The two symptom scales that were included, drive for thinness and bulimia, measure some of the central characteristics of an eating disorder. Each scale included 7 items and all items were scored on a 6-point Likert scale ranging from 1 (*never*) to 6 (*always*). Example items are: 'I feel extremely guilty after overeating' (drive for thinness) and 'I eat when I am upset' (bulimia). Cronbach's alpha's at Times 1, 2, and 3 were 0.91, 0.92, and 0.93, respectively, for drive for thinness, and 0.78, 0.78, and 0.88 for bulimia.

COVID-19

The impact of the COVID-19 pandemic at T3 of the data collection was assessed with two sets of seven self-constructed items. The first set of items assessed the pandemic's negative and/or positive influence on different life aspects (e.g., social life, physical and mental health etc.), rated on a scale from -3 (*strong negative impact*) to +3 (*strong positive impact*). The second set of items measured the pandemic's influence on a person's negative affect (e.g., I feel scared), rated on a 7-point Likert scale ranging from 1 (*completely disagree*) to 7 (*completely agree*). Cronbach's alpha's were 0.81 and 0.86, respectively. Exploratory factor analysis (EFA) indicated a one-factor solution based on the eigenvalues and a scree plot for each set of seven items. The factor which contained the first set of items explained 48.25% of the variance with factor loadings from 0.511 to 0.881. The factor which contained the second set of items explained 54.58% of the variance with factor loadings from 0.517 to 0.810.

Statistical Analyses

First, it was investigated if the study variables were related to missing data. Of the 403 adolescents who entered the study, 138 participated at the final measurement wave (133 participants participated at all time-points, 178 missed 1 time-point, and 92 missed 2 time-points). To address differential attrition, a quasi-Poisson regression analysis was conducted to predict the number of missed waves by gender, age, COVID-19 variables, and main study variables. Only the demographic variables gender and age were associated with missingness, with both male gender

($B = 0.447$, $p < 0.001$) and higher age ($B = 0.176$, $p = 0.003$) being associated with a higher number of missed waves.

Second, latent class growth analysis (LCGA) on all five identity processes simultaneously was used to identify identity trajectory classes (Luyckx et al., 2013). The path from the linear slope to the indicator at Time 1 was fixed to 0 so that the mean intercept would represent the initial mean level. Given the equally spaced measurement intervals, subsequent linear slope pattern coefficients were fixed at 1, and 2 for Time 2 and Time 3, respectively. To account for non-normality, the models were estimated with maximum likelihood estimation with robust standard errors (MLR). LCGA solutions with one to six classes were estimated. Several criteria were used to decide on the number of classes (Masyn, 2013). These criteria did not always clearly indicate a single best-fitting model. Hence, it was important to balance objective fit with parsimony and interpretability to arrive at a meaningful solution (Johnson et al., 2007). First, the Akaike Information Criterion (AIC)[1], the Bayesian information criterion (BIC), and the sample size-adjusted BIC (SABIC) for a solution with *k* classes had to be lower (at least 10 points; Kass & Raftery, 1995) than for a solution with *k*-1 classes, suggesting that adding classes improved model fit. Second, classification quality was assessed by entropy (*E*), a standardized summary measure of classification accuracy. Entropy ranges from 0.00 to 1.00, with values of 0.75 or higher indicating accurate classification (Reinecke, 2006). Third, a significant *p*-value for the Lo-Mendell-Rubin likelihood ratio test (LMR-LRT) and the bootstrap likelihood ratio test (BLRT) indicated added value of *k* classes over *k*-1 classes. Finally, the theoretical interpretability and meaningfulness of the classes were evaluated. If a solution with *k* classes emerged in which certain classes were difficult to interpret or did not add a meaningful class as compared to the more parsimonious solution with *k*-1 classes, the latter, more parsimonious solution was chosen. In line with this reasoning, all classes had to include at least 5% of the sample.

Third, assuming that the classification accuracy of the selected class solution was adequate, individuals were assigned to the trajectory class for which their posterior probability of group membership was highest (Luyckx et al., 2011). Age, adjusted BMI, and gender differences at baseline among the trajectory classes were examined. For age and adjusted BMI, a one-way multivariate analysis of variance (class membership as fixed factor and adjusted BMI/age as dependent variables) was performed with Tukey HSD post-hoc tests. For gender, a chi² cross-tabulation was performed and standardized residuals were inspected to determine significant discrepancies between observed and expected frequencies within each cell (i.e., an absolute value exceeding |2|).

Next, to examine whether the classes differed in their developmental trajectories of body-related variables and symptoms, multigroup latent growth curve (LGC) modeling was used. First, unconstrained LGC models with intercepts and linear slopes (again estimated using MLR and with linear slope terms fixed to 0, 1, and 2) freely estimated across identity trajectory classes were estimated for each outcome variable separately, resulting in nine unconstrained models. Adequate model fit was reflected by a root mean square error of approximation (RMSEA) below 0.08, a standardized root mean square residual (SRMR) below 0.10, a comparative fit index (CFI) above 0.90, and a χ^2-value as small as possible (given that models were estimated using the MLR estimator, this study focused on the Yuan-Bentler scaled chi²). Next, the models were re-estimated with intercepts constrained equal across classes; and finally, slopes were constrained equal across classes. If these constrained models provided a significantly poorer fit to the data compared to the baseline unconstrained model (χ^2-values of the constrained vs. unconstrained models were compared), these findings suggested that the trajectory classes differed from one another on at least some of the parameters tested. As a result, follow-up multigroup models estimated which intercepts or slopes could be held equal across each possible pair of classes. As such, it could be determined which specific trajectories differed from one another in terms of mean intercepts and slopes (Raymaekers et al., 2020).

Finally, exploratory analyses[2] were conducted to examine whether identity development was associated with the impact of the COVID-19 pandemic (assessed at Time 3). Associations between identity development and the impact of COVID-19 were examined by conducting a multivariate analysis of variance (MANOVA) with the identity trajectory classes as fixed factor. As follow-up exploratory analyses, univariate LGC modeling was performed on the five identity dimensions to assess how the latent trajectories of these dimensions were related to COVID-19 measures. In doing so, intercepts and slopes of the identity dimensions (with the intercept being set at the final time-point by fixing the linear slope terms to −2, −1, and 0 for Times 1-3, respectively) were regressed on the items related to COVID-19.

[1] The AIC, SABIC, and LMR-LRT were requested by a reviewer as additional criteria, and such, were not mentioned in the preregistration of the manuscript.

[2] Analyses were conducted on a limited sample, given that the students had to have participated at the third measurement point. These analyses were not preregistered.

Table 1 Descriptive Statistics of Study Variables at Times 1-3

Variable	Time 1 *M* (*SD*)	Time 2 *M* (*SD*)	Time 3 *M* (*SD*)
Commitment making	3.37 (0.86)	3.32 (0.90)	3.18 (1.08)
Identification commitment	3.37 (0.78)	3.31 (0.82)	3.41 (0.72)
Exploration breadth	3.48 (0.78)	3.63 (0.73)	3.80 (0.64)
Exploration depth	3.06 (0.78)	3.13 (0.84)	3.49 (0.74)
Ruminative exploration	2.73 (0.88)	2.82 (0.91)	3.06 (0.87)
Drive for thinness	2.42 (1.24)	2.41 (1.27)	2.64 (1.33)
Bulimia	1.96 (0.80)	2.08 (0.86)	2.11 (0.98)
Negative body image	3.03 (1.23)	3.07 (1.81)	3.19 (1.18)
Positive body image	3.48 (0.82)	3.53 (0.83)	3.49 (0.80)
Sociocultural pressures	1.88 (0.92)	1.92 (0.87)	2.26 (0.99)
Internalization thin ideal	2.76 (1.32)	2.83 (1.34)	3.07 (1.41)
Internalization muscular ideal	2.88 (1.23)	2.90 (1.20)	2.90 (1.15)
Appearance comparison	2.62 (0.93)	2.71 (0.87)	2.92 (0.86)
Self-objectification	2.64 (0.77)	2.67 (0.76)	2.86 (0.75)

Results

Preliminary Analyses

Table 1 presents means and standard deviations at the three time-points. Table 2 provides Pearson correlations at Times 1-3. Commitment making was significantly positively associated with drive for thinness at Time 1. Identification with commitment was negatively related to drive for thinness at Time 1 and Time 3, to bulimia and sociocultural pressures at Time 1, to internalization of the thin ideal, appearance comparison, and self-objectification at Time 1 and Time 2, and to negative body image at each time-point. Identification with commitment was positively related to positive body image at each time-point. Exploration in breadth was positively associated with drive for thinness and internalization of the muscular ideal at Time 1 and Time 2, with sociocultural pressures and self-objectification at Time 2, with internalization of the thin ideal at Time 1 and Time 3, and with appearance comparison at each time-point. Exploration in depth was positively related to internalization of the thin ideal at Time 1 and the muscular ideal at Time 2, and to drive for thinness, bulimia, sociocultural pressures, appearance comparison, and self-objectification at Time 1 and Time 2. Finally, ruminative exploration was positively related to all outcome variables at each time point, except for a negative relationship with positive body image.

Identifying Identity Trajectory Classes

Table 3 presents the results of LCGA on the five identity dimensions, including all AIC, BIC, SABIC, entropy, LMR-LRT, and BLRT values, as well as the trajectory group prevalence. Because of a lower AIC, BIC, and SABIC value, the four-class solution (AIC = 9365.235; BIC = 9597.174; SABIC = 9413.134) was preferred over the three-class solution (AIC = 9539.072; BIC = 9727.022; SABIC = 9577.887). The four-class solution had an adequate entropy value ($E = 0.809$) and although the LMR-LRT value of the four-class solution was not significant ($p = 0.173$), the BLRT-value was significant ($p < 0.001$). Additionally, in the five-class solution, one of the classes consisted of only 6% of the sample and the classes were theoretically more difficult to interpret. Hence, the more parsimonious four-class solution was chosen.

Table 4 provides the estimates of mean intercepts and mean slopes for all trajectory classes of the four-class solution. Partially in line with hypotheses, class 1 (35%) resembled achievement and included adolescents scoring relatively high on both commitment and exploration processes, except for ruminative exploration. Whereas identity processes remained rather stable over time, exploration in breadth tended to increase over time. Class 2 (27%) was labeled carefree diffusion and consisted of adolescents scoring relatively low to moderate on all dimensions. All identity processes remained rather stable over time. Class 3 (29%) resembled moratorium and included adolescents scoring relatively low on both commitment processes and high on all exploration processes. Both pro-active as well as ruminative exploration processes tended to increase over time. Finally, class 4 (9%) resembled troubled diffusion and consisted of adolescents scoring low on all identity processes, except for ruminative exploration. All three exploration dimensions substantially increased over time, hence this class was labeled more specifically as troubled diffusion-increasing exploration.

Further analyses indicated that the classes did not differ on age at Time 1 ($F(3) = 2.27$, $p = 0.08$), but differed on gender ($\chi^2(3) = 20.16$, $p < 0.001$). Based on an inspection of the standardized residuals, male adolescents were significantly overrepresented in the carefree diffusion class (61.1% boys), whereas female adolescents were overrepresented in the moratorium class (67.5% girls). Finally, the classes did not differ on adjusted BMI ($F(3) = 0.400$, $p = 0.75$).

Associations with Body Image and Body-Related Symptoms

Table 5 provides all the baseline parameter estimates of multigroup LGC modeling. For sociocultural pressures, an adequate fit was found for the unconstrained model [$\chi^2(8) = 13.21$, $p = 0.10$; RMSEA = 0.08; CFI = 0.97; SRMR = 0.05]. Constraining intercepts as equal among classes resulted in a significantly decreased model fit

Table 2 Pearson correlation coefficients between Identity Processes and Body-related variables at Times 1-3

Variable	Commitment making	Identification with commitment	Exploration in breadth	Exploration in depth	Ruminative exploration
Drive for thinness					
T1	0.10*	−0.14**	0.12*	0.15**	0.30**
T2	0.07	−0.08	0.14*	0.18**	0.17**
T3	0.04	−0.18*	0.13	0.02	0.24**
Bulimia					
T1	−0.03	−0.17**	0.06	0.14**	0.35**
T2	0.05	−0.07	0.10	0.15**	0.23**
T3	0.04	−0.16	0.08	0.12	0.29**
Negative body image					
T1	0.00	−0.26**	0.04	0.06	0.33**
T2	−0.07	−0.26**	−0.04	−0.01	0.18**
T3	0.01	−0.24**	0.11	−0.05	0.25**
Positive body image					
T1	0.06	0.31**	0.05	0.05	−0.34**
T2	0.06	0.27**	0.04	0.04	−0.19**
T3	0.05	0.28**	0.00	0.14	−0.28**
Sociocultural pressures					
T1	0.05	−0.13**	0.06	0.18**	0.32**
T2	0.08	−0.05	0.15**	0.15**	0.22**
T3	0.04	−0.11	0.08	0.07	0.24**
Internalization of thin app					
ideal					
T1	0.02	−0.19**	0.15**	0.11*	0.32**
T2	−0.06	−0.16**	0.04	0.10	0.24**
T3	0.02	−0.12	0.18*	0.07	0.26**
Internalization of Muscular ideal ididea					
muscular ideal					
T1	0.06	0.01	0.12*	0.08	0.17**
T2	0.11	0.08	0.16**	0.15**	0.16**
T3	0.07	0.11	0.15	0.11	0.20*
Appearance comparison					
T1	−0.05	−0.14**	0.13**	0.14**	0.31**
T2	−0.07	−0.11*	0.15**	0.20**	0.26**
T3	−0.10	−0.15	0.18*	0.10	0.36**
Self-objectification					
T1	0.01	−0.16**	0.08	0.17**	0.37**
T2	−0.01	−0.15**	0.11*	0.18**	0.30**
T3	−0.05	−0.16	0.15	0.02	0.37**

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

[$\Delta\chi^2(5) = 41.19$, $p < 0.001$], indicating that the classes differed from one another on initial levels of sociocultural pressures. Adolescents in carefree diffusion experienced significantly lower levels of sociocultural pressures compared to adolescents in the other classes. Further, although levels of sociocultural pressures increased significantly in achievement and troubled diffusion-increasing exploration, model comparison indicated that slopes could be constrained as equal among the classes [$\Delta\chi^2(5) = 6.47$, $p = 0.26$], indicating that the classes did not differ from one another in terms of changes over time.

Table 3 Results of Latent Class Growth Analysis on the Five Identity Dimensions

	AIC	BIC	SABIC	Entropy	LMR-LRT	BLRT	Trajectory Group Prevalence (%)					
							1	2	3	4	5	6
1 Class	10488.713	10588.686	10509.359	/	/	/	100					
2 Class	9777.829	9921.791	9807.559	0.786	$p < 0.001$	< 0.001	46	54				
3 Class	9539.072	9727.022	9577.887	0.784	p = 0.080	< 0.001	27	26	47			
4 Class	*9365.235*	*9597.174*	*9413.134*	*0.809*	*p = 0.173*	*< 0.001*	*35*	*27*	*29*	*9*		
5 Class	9240.253	9516.180	9297.236	0.809	p = 0.099	< 0.001	21	25	16	32	6	
6 Class	9185.968	9505.883	9252.035	0.831	p = 0.049	< 0.001	5	38	9	23	3	22

AIC Akaike Information Criterion, *BIC* Bayesian Information Criterion, *SABIC* Sample size-adjusted BIC, *LMR-LRT* Lo-Mendell-Rubin Likelihood Ratio Test, *BLRT* Bootstrapped Likelihood Ratio Test. The four class solution (in italics) was selected

Table 4 Parameter Estimates of the Four Class Solution

Parameters	Total sample	Identity Trajectory Class			
		Achievement	Carefree diffusion	Moratorium	Troubled diffusion-increasing exploration
Commitment making					
mean intercept	3.382***	4.072***	3.274***	3.052***	2.128***
mean slope	−0.084**	−0.072	−0.093	−0.074	−0.170
Identification commitment					
mean intercept	3.354***	4.008***	3.254***	3.030***	2.200***
mean slope	0.007	−0.048	0.009	0.035	0.077
Exploration in breadth					
mean intercept	3.480***	3.893***	2.982***	3.729***	2.630***
mean slope	0.160***	0.097*	0.054	0.119*	0.571***
Exploration in depth					
mean intercept	3.028***	3.560***	2.545***	3.134***	2.089***
mean slope	0.194***	0.121	0.110	0.215***	0.366*
Ruminative exploration					
mean intercept	2.714***	2.472***	2.351***	3.275***	2.940***
mean slope	0.152***	0.103	0.015	0.141*	0.571***

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

For internalization of the thin ideal, the unconstrained model did not provide an adequate fit across all indices [$\chi^2(6) = 15.94$, $p = 0.01$; RMSEA = 0.13; CFI = 0.95; SRMR = 0.10]. Constraining intercepts as equal among classes resulted in a significantly decreased model fit [$\Delta\chi^2(3) = 28.45$, $p < 0.001$], indicating that the classes differed from one another on initial levels of internalization of the thin ideal. Adolescents in carefree diffusion were less likely to internalize the thin ideal compared to adolescents in the other classes. Model comparison indicated that slopes could be constrained as equal among the classes [$\Delta\chi^2(3) = 0.36$, $p = 0.95$], indicating that the classes did not differ from one another in terms of changes over time.

For internalization of the muscular ideal, the unconstrained model provided, except for the SRMR-value, an adequate fit [$\chi^2(6) = 7.64$, $p = 0.27$; RMSEA = 0.05; CFI = 0.99; SRMR = 0.11]. Analyses indicated that both intercepts and slopes could be constrained as equal among the classes [$\Delta\chi^2(3) = 2.87$, $p = 0.41$; $\Delta\chi^2(3) = 1.63$, $p = 0.65$], indicating that the classes did not differ from one another on initial levels of internalization of the muscular ideal or in terms of changes over time.

For self-objectification, the unconstrained model provided, except for the SRMR-value, an adequate fit [$\chi^2(7) = 10.14$, $p = 0.18$; RMSEA = 0.07; CFI = 0.98; SRMR = 0.14]. Constraining intercepts as equal among classes resulted in a significantly decreased model fit [$\Delta\chi^2(3) = 32.60$, $p < 0.001$], indicating that the classes differed from one another on initial levels of self-objectification. Adolescents in achievement reported significantly lower levels

Table 5 Baseline Parameter Estimates of Multigroup Latent Growth Curve Modeling

Parameters	Identity Trajectory Class			
	Achievement	Carefree diffusion	Moratorium	Troubled diffusion-increasing exploration
Drive for thinness				
Mean intercept	2.458***[b]	2.016***[a]	2.660***[b]	2.579***[b]
Mean slope	0.069	−0.014	0.070	0.059
Bulimia				
Mean intercept	1.925***[ac]	1.761***[a]	2.230***[b]	2.016***[bc]
Mean slope	0.095*	0.002	0.108*	0.032
Negative body image				
Mean intercept	2.905***[a]	2.709***[a]	3.325***[b]	3.486***[b]
Mean slope	0.070	−0.028	0.010	0.039
Positive body image				
Mean intercept	3.619***[b]	3.600***[b]	3.357***[a]	3.127***[a]
Mean slope	0.017	0.077	0.034	0.014
Sociocultural pressures				
Mean intercept	1.885***[b]	1.526***[a]	2.117***[b]	1.921***[b]
Mean slope	0.163***	0.058	0.079	0.203*
Internalization thin ideal				
Mean intercept	2.770***[b]	2.284***[a]	3.047***[b]	3.062***[b]
Mean slope	0.112	0.011	0.046	0.193
Internalization muscular ideal				
Mean intercept	2.988***	2.781***	2.948***	2.663***
Mean slope	0.104	0.035	−0.009	−0.096
Physical appearance comparison				
Mean intercept	2.598***[b]	2.262***[a]	2.946***[c]	2.717***[bc]
Mean slope	0.103[bc]	0.000[ab]	−0.023[a]	0.223**[c]
Self-objectification				
Mean intercept	2.645***[b]	2.332***[a]	2.872***[c]	2.744***[bc]
Mean slope	0.062	0.080	0.002	0.142

Within rows, intercepts and slopes differ at $p < 0.05$ if they have different superscripts (letters a, b, or bc). Parameters without superscripts do not differ significantly from one another. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

of self-objectification compared to moratorium, whereas adolescents in carefree diffusion reported the lowest levels of self-objectification. Model comparison indicated that slopes could be constrained as equal among the classes [$\Delta\chi^2(3) = 1.11$, $p = 0.78$], indicating that the classes did not differ from one another in terms of changes over time.

For appearance comparison, an adequate fit was found for the unconstrained model [$\chi^2(9) = 2.82$, $p = 0.97$; RMSEA = 0.00; CFI = 1.00; SRMR = 0.03]. Constraining intercepts as equal among classes resulted in a significantly decreased model fit [$\Delta\chi^2(3) = 42.71$, $p < 0.001$], indicating that the classes differed from one another on initial levels of appearance comparison. Adolescents in achievement reported significantly lower levels of appearance comparison than in moratorium, whereas adolescents in carefree diffusion reported the lowest levels of appearance comparison. Constraining slopes as equal among classes resulted in a significantly decreased model fit as well [$\Delta\chi^2(3) = 7.93$, $p = 0.05$], indicating that the classes differed from one another in terms of changes over time. Appearance comparison increased significantly more over time for adolescents in achievement compared to adolescents in moratorium. Adolescents in troubled diffusion-increasing exploration experienced the largest increases in appearance comparison, with changes over time significantly different from those in moratorium and carefree diffusion.

For negative body image, an adequate fit was found for the unconstrained model [$\chi^2(6) = 2.86$, $p = 0.83$; RMSEA = 0.00; CFI = 1.00; SRMR = 0.03]. Constraining intercepts as equal among classes resulted in a significantly

decreased model fit [$\Delta\chi^2(3) = 25.94$, $p < 0.001$], indicating that the classes differed from one another on initial levels of negative body image. Adolescents in achievement and carefree diffusion experienced significantly lower levels of negative body image compared to adolescents in moratorium and troubled diffusion-increasing exploration. Model comparison indicated that slopes could be constrained as equal among the classes [$\Delta\chi^2(3) = 1.79$, $p = 0.62$], indicating that the classes did not differ from one another in terms of changes over time.

For positive body image, an adequate fit was found for the unconstrained model [$\chi^2(7) = 11.48$, $p = 0.12$; RMSEA = 0.08; CFI = 0.98; SRMR = 0.07]. Constraining intercepts as equal among classes resulted in a significantly decreased model fit [$\Delta\chi^2(3) = 16.24$, $p < 0.001$], indicating that the classes differed from one another on initial levels of positive body image. Adolescents in achievement and carefree diffusion experienced significantly higher levels of positive body image compared to adolescents in moratorium and troubled diffusion-increasing exploration. Model comparison indicated that slopes could be constrained as equal among the classes [$\Delta\chi^2(3) = 0.48$, $p = 0.92$], indicating that the classes did not differ from one another in terms of changes over time.

For drive for thinness, an adequate fit was found for the unconstrained model [$\chi^2(7) = 8.44$, $p = 0.30$; RMSEA = 0.05; CFI = 0.99; SRMR = 0.04]. Constraining intercepts as equal among classes resulted in a significantly decreased model fit [$\Delta\chi^2(3) = 20.56$, $p < 0.001$], indicating that the classes differed from one another on initial levels of drive for thinness. Adolescents in carefree diffusion reported significantly lower levels of drive for thinness compared to the other classes. Model comparison indicated that slopes could be constrained as equal among the classes [$\Delta\chi^2(3) = 2.89$, $p = 0.41$], indicating that the classes did not differ from one another in terms of changes over time.

Finally, for bulimia, an adequate fit was found for the unconstrained model [$\chi^2(6) = 6.64$, $p = 0.36$; RMSEA = 0.03; CFI = 1.00; SRMR = 0.05]. Constraining intercepts as equal among classes resulted in a significantly decreased model fit [$\Delta\chi^2(2) = 25.20$, $p < 0.001$], indicating that the classes differed from one another on initial levels of bulimia. Adolescents in achievement reported significantly lower levels of bulimia compared to moratorium, whereas adolescents in carefree diffusion scored lower compared to moratorium and troubled diffusion-increasing exploration. Further, although bulimia increased significantly for adolescents in achievement and moratorium, model comparison indicated that slopes could be constrained as equal among the classes [$\Delta\chi^2(2) = 5.50$, $p = 0.06$], indicating that the classes did not differ from one another in terms of changes over time.

Table 6 Beta regression coefficients of the Identity Processes regressed on COVID-19 items and values of explained variances

	Impact of COVID-19	
	β	R^2
Commitment making		
mean intercept	−0.17	0.03
mean slope	−0.21	0.18
Identification commitment		
mean intercept	−0.10	0.02
mean slope	−0.05	0.08
Exploration in breadth		
mean intercept	0.33**	0.10
mean slope	0.08	0.01
Exploration in depth		
mean intercept	0.28*	0.07
mean slope	−0.01	0.00
Ruminative exploration		
mean intercept	0.54***	0.31***
mean slope	0.27*	0.10

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Associations with the Impact of the COVID-19 Pandemic

Given that the items assessing the pandemic's influence on different life aspects showed non-significant correlations with the identity dimensions, only the results regarding the items assessing the pandemic's influence on a person's negative affect are discussed. With regard to the associations between identity development and the impact of COVID-19, significant differences between the identity classes on the impact of COVID-19 on a person's negative affect were found ($F = 10.858$, $p < 0.001$, $\eta 2 = 0.194$). Post-hoc analyses indicated that adolescents in carefree diffusion ($M = 3.19$; $SD = 1.35$) experienced the least influence by COVID-19 on their negative affect as compared to adolescents in achievement ($M = 4.21$; $SD = 1.35$), moratorium ($M = 4.65$; $SD = 0.94$), and troubled diffusion-increasing exploration ($M = 4.78$; $SD = 0.59$) ($p < 0.05$). Finally, Table 6 shows positive associations between the initial levels of all exploration processes and changes over time in ruminative exploration with the impact of COVID-19 on negative affect.

Discussion

According to Erikson (1968), feeling at home in one's body is crucial to developing a strong personal identity. During the past decade, research findings have supported Erikson's theoretical thinking and pointed out the complex interplay

between identity and the body. However, research on personal identity and one's body has developed mainly in isolation and has primarily focused on negative body image (Daniels & Gillen, 2015; Nelson et al., 2018). To broaden the understanding of the link between identity and one's body, the current study examined identity trajectory classes throughout adolescence and investigated how these identity trajectory classes were associated with differential development in negative and positive body image and body-related variables. Four identity trajectory classes emerged, partially in line with expectations. Additionally, evidence was found for the developmental association linking identity formation to adolescents' body image and body-related variables. These results emphasize the need to target adolescents struggling with their identity development, as they may be more vulnerable for body image problems and other body-related symptoms.

Identity Trajectory Classes throughout Adolescence

Partially consistent with previous studies (Luyckx et al., 2013; Raemen et al., 2022), four identity trajectory classes were identified: achievement, carefree diffusion, moratorium, and troubled diffusion-increasing exploration. Although identity trajectory classes were differentiated primarily in terms of initial levels of the identity dimensions, some differential changes over time were also observed. Interestingly, relatively high and/or increasing levels of exploration were uncovered in the identity trajectory classes, which was in contrast with previous findings. This finding might be explained by the younger age group of this study and the COVID-19 pandemic at Time 3, as initial levels of all exploration processes and changes over time in ruminative exploration were associated with the impact of COVID-19. It is plausible that adolescents became more self-doubting and questioning due to the pandemic, as their known identity building blocks (e.g., hobbies, contact with peers, etc.) were substantially affected, for instance, by lockdown measures. Further, the current study could not identify a separate foreclosure trajectory class. However, readers should note that adolescents in carefree diffusion made commitments to a certain degree, somewhat resembling characteristics of foreclosed individuals. However, the levels of their commitment processes were not elevated enough to label this class as foreclosure. Importantly, it is not uncommon that not all identity trajectory classes are identified in each specific study (see, e.g., the study by Hatano & Sugimura (2017) that also did not identify a longitudinal foreclosure class), possibly due to sample characteristics or context-specific factors such as the COVID-19 pandemic (Fig. 1).

First, with respect to the four trajectory classes obtained, and in line with previous longitudinal research (Luyckx et al., 2013; Raemen et al., 2022), adolescents in the achievement trajectory class pro-actively explored identity options and they were able to make strong commitments

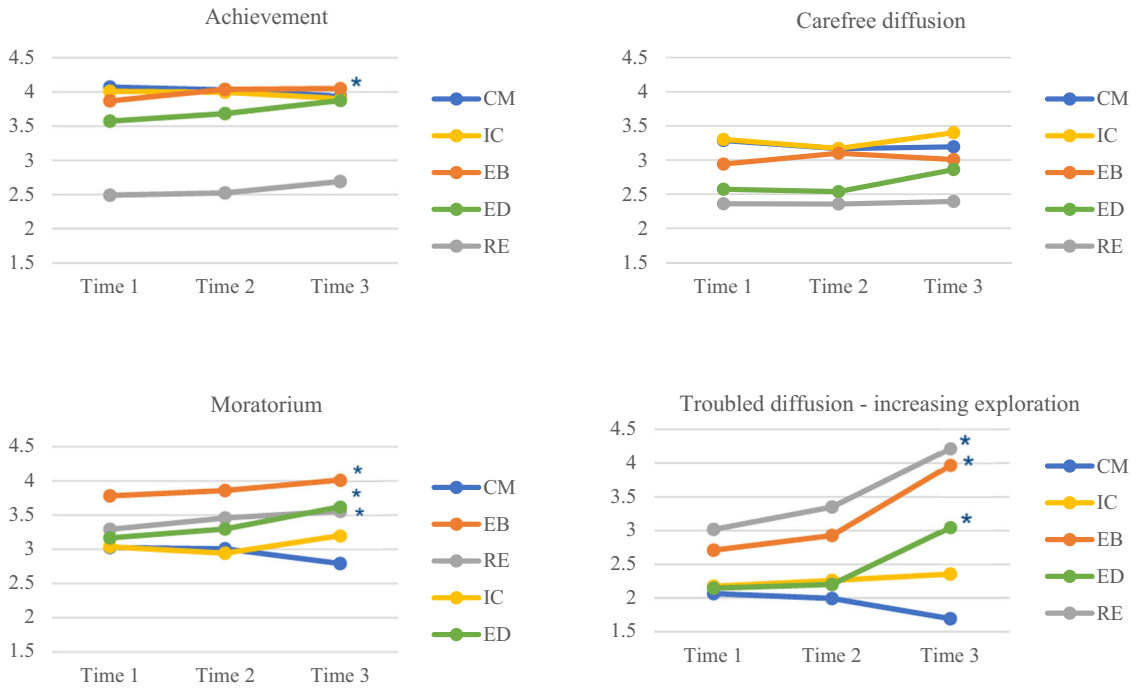

Fig. 1 Observed mean trends for the five identity processes in the identified identity trajectory classes. CM Commitment making, IC Identification with commitment, EB Exploration in breadth, ED Exploration in depth, RE Ruminative exploration. "*" indicates significant changes over time

and identify with these commitments, without being inhibited by ruminative exploration. Although these adolescents identified with their identity choices, they increasingly kept exploring their identity options in breadth over time. Based on their engagement in commitment and pro-active exploration processes, this achievement trajectory class seemed to be a prime example of an adaptive identity search (Schwartz et al., 2011).

Second, also in line with previous research, adolescents in the carefree diffusion trajectory class developed tentative commitments to a certain degree, but without systematically exploring different identity options. They seemed unmotivated to fully engage themselves in their identity quest (Schwartz et al., 2011). These carefree-diffused adolescents also did not seem to ruminate about their identity search.

Third, as expected, adolescents in the moratorium trajectory class kept exploring different identity options in breadth and in depth, without making strong commitments or identifying with these choices. Adolescents in moratorium seemed to worry about their tentative commitments and their search for alternative identity building blocks. In terms of changes over time, they increasingly explored identity options in both an adaptive and maladaptive way. This moratorium trajectory class may reflect less adaptive identity functioning to some extent, as these adolescents seemed to lack a strong identity foundation (Schwartz et al., 2016).

Finally, an identity trajectory class resembling troubled diffusion-increasing exploration was identified. As expected, troubled-diffused adolescents worried about identity issues, hindering them from adequate identity work, as indicated by limited engagement in pro-active exploration and commitment processes. Whereas carefree-diffused adolescents seemed unmotivated to engage in identity development, troubled-diffused adolescents seemed to be unable to translate their worries into a proactive identity search. However, in contrast to expectations (Luyckx et al., 2013; Raemen et al., 2022), troubled-diffused adolescents increasingly tried to explore identity options in breadth and in depth over time. In other words, they tried to engage proactively in their identity quest, but at the same time they felt overwhelmed by this process (Schwartz et al., 2011). Consequently, based on these substantial increases in exploration processes over time, this trajectory class was labeled as troubled diffusion-increasing exploration. These increasing levels of exploration might again be linked to the COVID-19 pandemic. Although troubled-diffused individuals did not differ from adolescents in achievement and moratorium on the impact of COVID-19, troubled-diffused adolescents reported the strongest impact of COVID-19 on their negative affect. Moreover, increases over time in ruminative exploration were positively associated with the impact of COVID-19, meaning that the stronger someone experienced impact of the pandemic, the more someone was likely to ruminate about life choices, and vice versa.

Subsequently, results showed gender differences among the identity classes at Time 1, as female adolescents were overrepresented in moratorium and male adolescents were overrepresented in carefree diffusion, as expected (Raemen et al., 2022; Verschueren et al., 2017). Further, as expected, the identity trajectory classes did not differ on adjusted BMI, indicating that the evaluation of the body (i.e., body image) might be a more important factor to identity functioning than body shape in itself (Nelson et al., 2018). Finally, in contrast with previous research (Raemen et al., 2022; Verschueren et al., 2017), no age differences were found among the identity trajectory classes. This finding might be explained by the younger age group, as there might be more differentiation at a slightly older age (Luyckx et al., 2013). Late adolescence and emerging adulthood indeed offer many opportunities for pro-active identity exploration in various domains of life, possibly resulting in more inter-individual differences (Arnett, 2000).

Identity Trajectory Classes and Differential Development in Body Image and Body-Related Variables

The results provided a nuanced picture of the co-development of identity and the body, and findings were dependent on which specific body-related variables the study focused on. In line with expectations, the levels of negative and positive body image and body-related variables differed among identity trajectory classes. These findings suggested that adolescents in identity trajectory classes reflecting less adaptive identity functioning, such as moratorium and troubled diffusion-increasing exploration, displayed higher levels of negative body image and body-related symptoms and lower levels of positive body image. Although class differences were primarily found on the initial levels of the external variables, some differential changes over time were also observed.

In line with hypotheses, adolescents in moratorium and troubled diffusion-increasing exploration showed the least adaptive functioning. In addition to their arduous identity search, they seemed more vulnerable to sociocultural pressures and internalization of the thin ideal. Consistent with previous research (Corning & Heibel, 2016), these findings seem to indicate that adolescents who are lacking a strong identity foundation and get stuck in ruminatively exploring different identity options, are more prone to internalize appearance ideals (and especially the thin ideal) to derive a sense of identity. In line with this tenet, these adolescents seemed also more likely to self-objectify and engage in appearance comparison to evaluate themselves. These findings can also be understood from the identity styles

model which focuses on individual differences in cognitive styles underlying the identity exploration process (Berzonsky, 1988). Especially the diffuse-avoidant identity style, in which individuals adopt an evasive and procrastinatory orientation toward decision making, is associated with internalizing appearance ideals. In line with this, adolescents in moratorium and troubled diffusion-increasing exploration seemed to avoid or procrastinate their identity choices by continuing to ruminatively explore identity options without making strong commitments. As a result, these adolescents may turn to the body perfect ideal in the expectation that they will achieve happiness and success when they reach this ideal or as a way to avoid coping with their identity issues (Verstuyf et al., 2014; Wheeler et al., 2001). Moreover, troubled-diffused adolescents seemed vulnerable to increasingly engage in appearance comparison over time, which might be associated with their strong increases in pro-active and ruminative exploration over time. Because these adolescents lack a stable sense of identity when they begin to increasingly explore identity alternatives, they may be even more vulnerable to being guided by extrinsic goals and societal ideals, resulting in increased engagement in appearance comparison (Duriez et al., 2012). Subsequently, adolescents in these identity trajectory classes experienced higher levels of negative body image and lower levels of positive body image, confirming the established interplay between identity and one's body image (Palmeroni et al., 2020; Verschueren et al., 2018). Interestingly, given that the interplay between identity and adolescents' positive body image is still understudied, these findings suggested that identity formation indeed might be associated with one's positive body image as well. Finally, adolescents in moratorium and troubled diffusion-increasing exploration seemed more vulnerable to develop eating disorder symptoms (i.e., drive for thinness and bulimia). These results are in line with previous research (Palmeroni et al., 2020; Raemen et al., 2022), indicating that adolescents who are searching for a personal identity without making strong commitments may turn to eating disorder symptoms as identity substitutes.

Based on the idea that achievement may be the most adaptive identity trajectory class, these adolescents were expected to also behave most adaptively in terms of body image and body-related behaviors (Luyckx et al., 2013). With regard to self-objectification, appearance comparison, negative and positive body image, and bulimia, adolescents in achievement indeed displayed better scores as compared to adolescents in moratorium and/or troubled diffusion-increasing exploration. However, with regard to sociocultural pressures, internalization of appearance ideals, and drive for thinness, adolescents in achievement did not behave differently from adolescents in moratorium and troubled diffusion-increasing exploration. Thus, adolescents in achievement also seemed to turn to socially available identity building blocks, such as appearance ideals, in their search for a strong personal identity. Interestingly, adolescents in carefree diffusion generally displayed the most adaptive scores regarding body image and body-related variables. This finding might be explained by the fact that male adolescents were overrepresented in carefree diffusion and, more importantly, that carefree-diffused adolescents were less concerned about their identity quest. Given the identity-body interplay, it is possible that carefree-diffused adolescents were doing better in terms of body-related symptoms in the short term, because their limited identity search might made them more immune to sociocultural pressures regarding appearance (Corning & Heibel, 2016). In other words, when individuals seem unmotivated to fully engage in their identity search and to explore identity options, they may be less vulnerable to turn to socially constructed appearance ideals as identity building blocks as well. This finding highlights the importance to focus also on the specific content of the identity exploration and commitment processes. However, the identity questionnaire used in the current study focused broadly on the degree to which adolescents engaged in exploration and commitment processes with respect to their future plans and lifestyle (without detailing what these plans and lifestyle exactly entail). Adolescents who are more involved in pro-active exploration or commitment processes, for instance, may commit to rather pathological identity content (such as being excessively thin). Furthermore, the lack of a strong personal identity might make these carefree diffused individuals more vulnerable in the long run for developing pathological symptoms, as an integrated identity tends to become increasingly important for one's well-being throughout the twenties (Kling et al., 2018; Luyckx et al., 2013).

Practical Implications

Although no strong conclusions for clinical practice can be made, the current findings may have several implications for the prevention and intervention of body image problems and other body-related symptoms in adolescents. As the current study confirms the intricate link between identity and one's body in adolescence, it seems important to target adolescents who are struggling with their identity development, as they may be more vulnerable to also struggle with their body image and other body-related symptoms. In other words, when identity development becomes even more challenging (e.g., due to a pandemic), it is important for clinicians to be aware of bodily concerns as well. Further, besides clinicians, the immediate social environment may promote pro-active identity exploration and may support adolescents in committing to healthy identity choices.

For instance, research has demonstrated that positive youth development (PYD) interventions in schools or other communities can have a beneficial impact on identity formation (Eichas et al., 2017). More concretely, schools can organize exercises with students to guide students in sharing life stories, discovering personal strengths, co-constructing life goals, and strategies for achieving these goals (Eichas et al., 2014). Findings suggested that such PYD interventions, focusing on expanding and enhancing personal potentials and meaningful aspect of one's life, can empower adolescents to define who they are and what they wish to achieve in life (Eichas et al., 2017). Relatedly, families and peers may also stimulate adolescents to reflect on their intrinsic life goals and to explore different aspects of the self that are not only related to body and appearance. In this way, adolescents may end up developing a more diversified and intrinsically oriented sense of self as a resource against the confrontation with the body perfect ideal. Finally, as associations between identity formation and positive body image have been found, it might be helpful to strengthen a positive body image in adolescents. It is known that reducing negative body image and enhancing positive body image might prevent or reduce eating disorder symptoms, and that body image and pressures regarding appearance ideals might impact identity formation as well (Palmeroni et al., 2021; Palmeroni et al., 2020). Hence, strengthening positive body image besides reducing negative body image and appearance-related pressures might positively impact eating disorder symptomatology and identity development. As body ideals are socially constructed, both the direct social environment (i.e., parents, teachers, and peers) and the larger community might have a crucial role in adolescents' enhancement of healthy attitudes towards the body and appearance. For example, given that body acceptance by others can positively affect one's body image, it might be helpful for adolescents if parents, teachers, and peers would provide positive and accepting messages related to one's body (Andrew et al., 2016).

Limitations and Suggestions for Future Research

Some limitations should be considered. First, although the three-wave longitudinal design was a strength of the current study, the time span was limited to a period of only two years, which does not allow us to draw conclusions about long-term functioning. Investigating adolescents over a longer time period could give us a greater insight into the co-development of identity and the body during adolescence. Second, the study faced a large drop-out on the third measurement wave, which is presumably due to the fact that this last measurement wave took place during the COVID-19 pandemic. Third, the current study exclusively made use of self-report questionnaires, which is the preferred way to assess subjective processes. However, self-reports might be influenced by memory recall, and, inaccurately high correlations among the study variables could occur as a result of shared method variance (Tylka, 2012). Combining this method with a multi-method or multi-informant approach might provide additional information and is advised for future studies. Relatedly, future research could also benefit from investigating this identity-body interplay from a narrative identity approach and focusing on the content of one's identity (Skhirtladze et al., in press). From this point of view, it would be interesting to investigate whether sociocultural pressures and appearance ideals are equally embedded into one's identity in the different statuses; or, similarly, what the different motives are behind the thin versus the muscular appearance ideal. Finally, although gender-adjusted measures assessing appearance ideals internalization (i.e., thin ideal and muscular ideal) were included (Schaefer et al., 2015), this study solely focused on disturbed eating behaviors aiming at achieving the thin ideal instead of also focusing on eating behaviors related to the muscular ideal such as eating more carbohydrates or using steroids. Moreover, the EDI-3 subscale (Garner, 2004) that assesses negative body image seems to focus primarily on women's physical features and bodily concerns (Tylka, 2012). Hence, these findings might be an underestimation of body image concerns and body-related symptoms in adolescent boys, as no significant differences for internalization of the muscular ideal were found. Future research should include additional measurements that can assess the full spectrum of bodily concerns across gender.

Conclusion

The complex longitudinal associations between identity formation and one's body in adolescence have remained largely understudied. Addressing these gaps, the current study provides insight into this identity-body interplay by investigating identity trajectory classes among adolescents and the co-development with body image and body-related variables. In sum, the current findings indicated that distinct identity pathways throughout adolescence emerge, characterized by differential levels of underlying exploration and commitment processes. Adolescents in identity trajectory classes reflecting less adaptive identity functioning, such as moratorium or troubled diffusion, displayed higher levels of negative body image and body-related symptoms and lower levels of positive body image. Finally, adolescents included in these less adaptive identity trajectory classes also experienced a stronger impact of the COVID-19 pandemic on their negative affect. Overall, the current study confirms that identity formation is intricately linked to adolescents' body image and other body-related symptoms.

Both future research and prevention or intervention programs are encouraged to take identity formation into account in relation to body image problems and other body-related symptoms in adolescents.

Data availability

The dataset analyzed during the current study are not publicly available but are available from the corresponding author (L.V.) on reasonable request.

Authors' Contributions L.V. conceived of the study, participated in its design and coordination, performed the statistical analyses and drafted the manuscript; L.R. helped with the data collection, participated in the design of the study, the interpretation of the data and helped to draft the manuscript; L.C. conceived of the study, participated in the design of the study, the interpretation of the data and helped to draft the manuscript; S.E. participated in the design of the study and helped to draft the manuscript; N.P. oversaw the data collection and helped to draft the manuscript; K.L. conceived of the study, participated in its design and coordination, performed the statistical analysis and helped to draft the manuscript. All authors read and approved the final manuscript.

Compliance with Ethical Standards

Conflict of Interest The authors declare no competing interests.

Ethical Approval The study was approved by the Social and Societal Ethics Committee of KU Leuven (G-2018 08 1303).

Informed Consent Written informed consent was provided by all participants included in the study and the parents of minor students provided active parental consent as well.

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