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Check Your Likes but Move Your Body! How the Use of Social Media Is Influencing Pre-Teens Body and the Role of Active Lifestyles

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Abstract: The use of social media has been increasing among pre-teens, affecting body satisfaction and leading to the development of a dualism between real and virtual identities. It is also associated with low physical activity levels. This cross-sectional study aimed to investigate the influence of dualism and physical activity levels on body satisfaction in male and female pre-teens. A sample of 2378 Italian pre-teens (Mage = 12.02 years, SD = 0.82) was recruited. Two anonymous and self-administered questionnaires were used to investigate social media use, the representation of the bodies through the social media, body image, and physical activity levels. Descriptive statistics were computed for all variables; Pearson's Chi square and Cramer's V were calculated to assess gender differences. Linear mixed models were used to explore the association between body satisfaction (dependent variable) and physical activity levels and the dualism (independent variables). It emerged that physical activity positively influences body satisfaction for both males and females; dualism negatively influences body satisfaction only for females. Therefore, it can be assumed that the engagement of pre-teens in offline activities counteracts the undesirable consequences of the beauty ideal models proposed by image-centred social media platforms.

Keywords: body image; pre-teens; social media; active lifestyle; physical appearance; well-being; cross-sectional study

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1. Introduction

Adolescence has been targeted as the most likely developmental phase for the occurrence of body dissatisfaction. Nevertheless, a growing body of research suggests that the rapid transition from childhood to adolescence may anticipate such dissatisfaction, as well as the onset of body image concerns and lead to dieting, social anxiety, inactive lifestyles, and related behaviours representing risk factors for chronic body image problems [1–4].

One of the factors influencing the acceleration of this transition may be represented by the massive use of social media. In fact, pre-teens (10–12 years) are massive users of social media platforms [5–7], despite the age limits imposed by many providers and platforms.

One possible strategy to counteract the detrimental effects of this phenomenon may be the promotion of an active lifestyle. Effectively, a recent study [8] demonstrated that physically active pre-teens are more likely to positively cope during stressful situations.

Therefore, the present study aimed to investigate the influence of active lifestyles and the dualism between the real and the virtual identity on body image satisfaction among Italian pre-teens. A second level of the analysis has been focused on exploring the differences between male and female participants and the use of social media among pre-teens.

1.1. The Human Experience of Embodiment

Body image represents one the most complex and profound human experiences of embodiment. It is generally defined as a multidimensional construct encompassing the

way one sees, thinks, feels, and behaves in relation to the appearance and function of one's body [9]. Recent research on body image has articulated this complex construct through several dimensions [10,11]. The subjective and affective dimensions are essentially related to satisfaction with one's body. In this light, body image is primarily concerned with the conscious appraisal of our own physical appearance [12] and with the satisfaction related with the perception of the appearance. These two dimensions are interlinked with the cognitive dimension that encompasses the thoughts, beliefs, attributions, and attitudes related to an individual's appearance and with the behavioral dimension that describes a person's body image-related behaviors such as avoidance of mirrors or body-monitoring behaviors. The assessment and the analysis of all these dimensions offer a comprehensive understanding of the individual experience related to body image [13].

Broadly, it has been postulated that body image is an elastic and changeable human experience that can be influenced by outside variables, such as peers and media [11]. The Tripartite Influence Model [14] is generally taken into consideration to understand the influence of the outside variables on body image's dimensions. In particular, three main elements are considered as directly affecting body image: peers, parents, and media. The model has been largely used as it brings together sociocultural, psychological, and biological factors that influence the way the individual, through the body, lives, interacts with others and experiences the world. Shroff and Thompson [15] have applied the model to explain the processes leading to body dissatisfaction and eating disturbances among adolescent girls. In addition, it has also been applied as a conceptual framework for understanding factors that might influence boys' body image concerns [16]. Finally, it has received further support with young adult samples [17].

The application of the Tripartite Influence Model to the analysis of the modern form of influence on body image's dimensions shows how, nowadays, technology and social media are the variables that, more than others, have an impact on body perception. Giddens [18] supported the idea that with modernity people started to live in a secular age in which individuals are responsible for defining their own body. The technology offers the opportunity to (re)shape the body "in our image" or in line with the body ideals. Through social media, in particular, artificial body images are represented and spread, reflecting unrealistic sociocultural standards that are impossible to attain. Spending time browsing social media is likely to be linked with body concerns as it allows users to engage in a constant process of comparison with idealised, and often altered, models of bodies [19,20]. In addition, advances in artificial intelligence and the opportunity to use filters and apps that can modify appearance have further exacerbated this process [13]. Those beauty filters are photo-editing tools enabling users to modify their aesthetic aspects such as smoothing their skin, enhance their lips and eyes, contour their nose, or modify their jaw and cheekbones for instance [21].

1.2. Appearance-Focused Media Content

Sociocultural theorists suggest that the appearance-focused media content may be associated with the internalisation of appearance [22]: individuals might experience concern over personal body image when the perceived appearance is compared with another imagined or idealised person [23]. More recently, following the Foucaudian idea of panoptic power mechanism [24,25], Sæle et al. [26] developed the BOPS (body and body pressure, omniopticon, panopticon and synopticon) model supporting the idea that, nowadays, young people's body image is linked to body pressure and subjected to various strategic power strategies including authorities, individuals, peers, family, celebrities, or social media. The pervasive presence of social media makes it difficult to distinguish between the real from the unnatural, the tangible from the virtual, the artificial from the natural. The youngest generations, particularly, consider the existence as a fusion of the real and the virtual life, an onlife dimension in which the lived experience is characterized by an 'ever-increasing' pervasiveness of information and communication technologies [27]. Individuals are not just passive consumers, but also producers of content that is dissem-

inated on social media. This determines a sort of omniopticon in which the many see the many, influencing each other [26] and in which the passive fruition of ideal images of the body is combined with the active manipulation and dissemination of idealized body models. The result is a relentless process of remixing and reshaping the body, with potential negative consequences.

Childhood and adolescence are two crucial periods for the development of body image, as growth is accompanied by major changes in their body, their self-concept, mood, and social interactions [9]. A low level of self-esteem may increase risk of body concerns by impacting evaluations of one's personal attributes, including physical appearance [28].

Effectively, a high frequency of use of social media platforms, especially the image-centred platforms (i.e., Facebook, Instagram, and Snapchat), corresponds to greater body image concerns and eating disorder symptoms in men [29]. Similar results were also found for adolescent girls; in fact, Meier and Gray [30] reported that an elevated appearance exposure was significantly correlated with weight dissatisfaction, drive for thinness, thin ideal internalization, and self-objectification.

Furthermore, it has been suggested that age might be an important moderating factor of vulnerability to exposure to highly visual social media content, with younger adolescents most likely to experience negative outcomes. Moreover, women and individuals for whom appearance is strongly tied to attractiveness and self-worth may be at increased risk to be negatively influenced by social network platforms [31].

Effectively, pre-teens nowadays are eager social media users, even though the use of the most common social media—such as Instagram, TikTok, etc.—is not intended for them since those platforms have set an age limit of 13 or over, with several differences across Europe [7]. Despite existing limits, age verification mechanisms and parental consent tools, the limits to the use of social media among pre-teens are still ineffective [32]. Pre-teens can be exposed to risks such as inappropriate content, bullying, grooming, child sexual abuse, body shaming or radicalisation. Such age-inappropriate content is easily accessible and, often, without the direct control of the adults potentially mitigating the negative impacts [33].

The high investment in terms of time spent on social media suggests that this significant usage may influence pre-teens' self-evaluation, including body satisfaction, within a period of life in which the body image is shaped. A growing body of research shows that excessively investing in the body may contribute to the development of unhealthy behaviours and body concerns such as dieting, social anxiety, inactive lifestyles, and related behaviours considered risk factors for chronic body image problems [34]. Although adolescence appears to be a major transitional period in body image [35], it has been demonstrated that in the modern society the phase of transition begins earlier, during the preadolescence [36]: the rapid transition from childhood to adolescence is associated with the onset of body image issues, posing the risks of persistent social and health concerns [1,2].

According to the social comparison theory [37], the need for self-evaluation leads people to compare themselves with others who are similar rather than dissimilar to themselves. This comparison might be in the direction to profiles considered worse (downward social comparison) or better (upward social comparison) [38]. Broadly, in our society, physical appearance has become a relevant construct as it represents an important component of how individuals feel about themselves as a whole [39]. As a matter of fact, Chua and Chang [40] found that adolescent girls compare themselves and their appearance to peers with higher appreciation on social networking sites, with the number of likes representing a parameter used for the social comparison process. The upward social comparison, with posts receiving a higher number of likes than usual, might induce a decrease in perceived self-worth and body satisfaction; conversely, downward comparisons, with social network users with less likes than usual, preserve body satisfaction and self-esteem [41].

Additionally, it has been demonstrated that when an individual receives a "like" on a social network, the nucleus accumbens (a key brain structure activated by things that make an individual happy) is more active [42]. This mechanism might lead to the continuous

need of posting altered pictures aiming to respond to the beauty standards proposed on social networks with the goal of receiving more "likes" and to counteract the self-doubting induced by social networks [21]. This phenomenon is common especially among teens. Contrarily, if the posted picture does not obtain the expected number of likes, the post is often removed [43]. In particular, girls associate "likes" with peer appreciation of their physical beauty, resulting in the tendency to post selfies with the aim of getting "likes" and followers [40]. Nevertheless, the exposure to manipulated photos might lead to a lower body satisfaction, especially for girls [44] and the social comparisons are associated with negative mental health among preadolescents [45].

This condition of body dissatisfaction represents a potential risk factor for the development of depressive mood, notably for early adolescent girls [46]. Body dissatisfaction and depressive symptoms are directly associated with differences in relation to gender and over development. In particular, body dissatisfaction among girls tends to be associated with an increase in depressive symptoms over time, beginning in the early teenage years. For boys, the picture is more complicated, with evidence for both directions of association with differing prominence over development [47].

It has been previously reported that physical activity might be a possible positive mediator, counteracting the negative effects on body image satisfaction. For instance, Fernández-Bustos et al. [48] found that physical activity, as well as body mass index, directly affect body image: individuals practicing sport or physical activity report lower scores on many measures capturing negative body image constructs. Nevertheless, the nature of this relationship between physical activity and body dissatisfaction should be considered as bi-directional since body image has the potential to deter or motivate physical activity and sport participation [49]. To this regard, it is worthy to mention that higher amounts of sedentary time spent using digital media increases the risk for pre-teens of being overweight. However, this association was not found for pre-teens being active for at least 6 h per week in leisure-time physical activity, suggesting that adequate levels of physical activity during preadolescence may protect against the harmful long-term impact of high amounts of sedentary digital media use on weight [50]. In line with these findings, Rutter et al. [51] found that for adolescents a higher use of social media was associated with symptoms of depression, anxiety, and loneliness. Conversely, increased physical activity was associated with decreased depression and anxiety symptoms suggesting that physical activity has the potential to mediate the relationship between social media use and depression and anxiety. Under these circumstances, it can be maintained that an active lifestyle might contribute to counteracting the detrimental effects of sedentary behaviors and body dissatisfaction among preteens, as further demonstrated by Jankauskiene et al. [52] who found that adolescents practicing sports might have greater body appreciation, self-esteem and lower body dissatisfaction than adolescents not practicing any sport.

2. Materials and Methods

2.1. Study Design and Sample

The cross-sectional study involved a sample of 2378 Italian pre-teens aged 11–13 years (Mage = 12.02 years, SD = 0.82). Cross-sectional studies are best suited to determine the prevalence and the associations of multiple exposures and outcomes [53]. They are also useful for establishing preliminary evidence and exploring new theoretical constructs.

In total, 778 (32.7% of the total sample) (males: 54.1%; females: 45.9%) participants were 11 years old, 766 (32.2% of the total sample) (males: 51.9%; females: 48.1%) were 12 years old and 834 (35.1% of the total sample) (males: 52.5%; females: 47.5%) were 13 years old. The data collection was implemented during school hours in collaboration with the teachers at secondary schools. The strategy adopted was based on two anonymous and self-administered questionnaires aimed at investigating: social media use, including typology, intensity, image-based used, type of profiles (public/private); the representation of the bodies through the social media; the relationship between the natural and the virtual bodies; the body image; the level of physical activity. Ethical approval was obtained from

the Institutional Review Board of the Department of Human Sciences, Society and Health of the University of Cassino and Southern Lazio (Approval number: 3RA2.2022.06.15). Informed parent consent was also obtained along with the authorizations from all the schools involved in the survey.

2.2. Measurements

Firstly, all participants were asked to list their most used social networks and to indicate if the daily use was less than 2 h per day or 2 or more hours per day [54].

A questionnaire based on an adapted version of the Instagram Image Activity Scale (IIAS) and the Instagram Appearance Comparison Scale—IACS [55] was adopted to investigate the combined influence of social media use and peer factors. The questionnaire was composed of 15 items assessing the frequency with which various types of image-related activities are carried out on social networks (e.g., posting or watching photos, videos, stories, direct; "liking" photos and videos) related to the self, friends, and celebrities. The response options for the items were never (1), rarely (2), frequently (3), very frequently (4). The scale adopted (4-point scale) has demonstrated good internal consistency ($\alpha = 0.85$), 2-week test-retest reliability, and structural validity among the preadolescents.

To estimate the dualism between the virtual and the real body, 4 statements were presented (e.g., have you ever wanted to be in real life as you appear with the filters used to edit your body on social media?) with 3 possible responses: yes, often (2); yes, sometimes (1); never (0). The dualism score is obtained by the composite mean of the 4 items. Conceptually, the filtered images were considered as social-cultural models to which the pre-teens are inspired.

Body satisfaction was investigated by means of an adapted version of the Italian Body Image State Scale (BISS) [56,57]. The questionnaire is composed of 6 items with a 9-point response format for each item and the body satisfaction score is obtained by the composite means of the 6 items. With the view to providing a better representation of the respondents' opinion the response format was rescaled to 4 points. The scale adopted (4-point scale) has demonstrated good internal consistency ($\alpha = 0.83$), 2-week test-retest reliability, and structural validity among the preadolescents.

Finally, the level of physical activity was measured using the Italian version of the Physical Activity Questionnaire for Older Children (PAQ-C) [58]. The PAQ-C is a self-administered questionnaire providing a summary physical activity score derived from nine items, each scored between 1 (low level) and 5 (high level) with reference to the activities occurring the seven days before the administration of the questionnaire [59].

2.3. Statistical Analysis

The univariate- Shapiro-Wilks's W test—and multivariate tests suggested that data did not come from normally distributed univariate or multivariate distributions. Transformations did not correct normality. Therefore, non-parametric analysis was conducted for descriptive statistics. Generally, the extent of missing data across each outcome was moderate, ranging from 0 to 10%.

The sex differences for the answers of the IIAS and IACS scales were ascertained by Pearson's chi-squared test for independence and, where statistically significant differences were found, the size of the effects was assessed with the Cramer's V [60] and interpreted as follows: 0.1 represents a small effect, 0.3 represents a medium effect and 0.5 represents a large effect [61].

Additionally, Linear Mixed Models (LMM) were used to investigate how the variables called dualism and physical activity levels (independent variables) influence the pre-teens' body satisfaction (dependent variable) using the variability among subjects as random intercept. LMM involve a generalization of linear regression but with both fixed and random effects, giving a higher flexibility to the statistical model, making also possible to handle missing data instead of with-drawing subjects from the analysis [62] and to take into account the inter-individual variability [63]. All models were fitted with random

intercepts at participants' level and the models were tested for the whole sample and for males and females, separately. Bryk/Raudenbush R2 values were calculated for each LMM. Statistical analysis was performed with the Stata statistical software, version 15.1 (StataCorp, CollegeStation, USA) and the statistical significance of the results was accepted at $p < 0.05$.

3. Results

For each question only valid answers have been reported. Thus, the total for each answer may not reflect the total of participants.

Data collection involved 2378 (52.8% males) pre-teens. Among them, 2078 (87.5%) are social media users and 99% use messaging apps such as WhatsApp or Telegram, with the majority (60.9%) having a private profile. More specifically, males showed the higher frequency of having public profiles (63.8%) with respect to females (36.2%). Focusing on the details of the most used social media platforms, it emerged that the most used are TikTok (74.4%), Instagram (57.2%), Snapchat (27.9%). WhatsApp is the most used instant messaging app (99.9%).

Concerning the daily time spent on each of these social media platforms, for TikTok 66.2% of respondents declared to spend 2 or more hours (72.7% females); for Instagram 41.9% of respondents declared to spend 2 or more hours (55.7% females); for Snapchat 9.2% of respondents declared to spend 2 or more hours (68.9% females); for WhatsApp 54% of respondents declared to spend 2 or more hours (57.6% females).

Focusing on the IIAS scale, for the activity "take several selfies and share the best" on social media platforms results showed that, among the whole sample, 869 (37.1%) participants answered never whereas 790 (33.8%), 441 (18.8%), 241 (10.3%) answered rarely, often, or always, respectively.

Regarding the activity "modify selfies and videos before sharing" on social media platforms, results showed that, among the whole sample, 1265 (53.9%) participants answered never whereas 602 (25.7%), 341 (14.5%), 137 (5.8%) answered rarely, often, or always, respectively.

For the activity "send pictures or videos of myself to friends for approval before sharing" on social media platforms, results showed that, among the whole sample, 1270 (54.1%) participants answered never whereas 471 (20.1%), 375 (16%), 231 (9.8%) answered rarely, often, or always, respectively.

Moreover, for the activity "remove tags from pictures of videos with me I do not like" on social media platforms, results showed that, among the whole sample, 869 (37.2%) participants answered never whereas 536 (23%), 516 (22.1%), 413 (17.7%) answered rarely, often, or always, respectively.

The last activity investigated with the IIAS scale focused on the frequency of "removing pictures or videos if I do not receive enough likes". Overall, 1860 (79.8%) participants declared to never do this activity, whereas 288 (12.4%), 118 (5.1%), 66 (2.8%) answered rarely, often, or always, respectively.

The overall results of the IIAS scale, for males and females separately, are reported in Table 1.

The following level of investigation of the activities on image-centred social networks was obtained through the administration of the Instagram Appearance Comparison Scale (IACS). Firstly, the attention has been focused on the active usage of the preferred platform (regarding the self).

Among the whole sample, 725 (31.5%) of respondents declared to never "sharing selfies or videos with me"; 863 (37.5%), 571 (24.8%), 142 (6.2%) answered rarely, often, or always, respectively.

Regarding "posting stories or live stories with me" results indicated that 1116 (48.3%) never do this activity; 588 (25.4%), 405 (17.5%), 204 (8.8%) answered rarely, often, or always, respectively.

Table 1. Frequency of activities on social media platforms by male and female participants, according to the Instagram Image Activity Scale (IIAS).

Activity	Frequency of Activity				
	Never	**Rarely**	**Often**	**Always**	**Total**
Take several selfies and share the best	n (%)	n (%)	n (%)	n (%)	n
Males	604 (48.9)	423 (34.3)	148 (12)	59 (4.8)	1234
Females	265 (23.9)	367 (33.1)	293 (26.5)	182 (16.4)	1107
Pearson chi2(3)			240.4844		
p-value			<0.001		
Cramer's V			0.32		
Modify pictures and videos before posting					
Males	791 (63.9)	252 (20.4)	133 (10.8)	61 (4.9)	1237
Females	474 (42.8)	350 (31.6)	208 (18.8)	76 (6.9)	1108
Pearson chi2(3)			106.7561		
p-value			<0.001		
Cramer's V			0.21		
Send pictures or videos to friends for approval before posting					
Males	837 (67.6)	219 (17.7)	122 (9.9)	60 (4.9)	1238
Females	433 (39)	252 (22.7)	253 (22.8)	171 (15.4)	1109
Pearson chi2(3)			223.5139		
p-value			<0.001		
Cramer's V			0.31		
Remove tag do not like					
Males	573 (46.5)	299 (24.3)	228 (18.5)	132 (10.7)	1232
Females	296 (26.9)	237 (21.5)	288 (26.1)	281 (25.5)	1102
Pearson chi2(3)			149.4223		
p-value			<0.001		
Cramer's V			0.26		
Remove pictures or videos with few likes					
Males	1018 (82.6)	134 (10.9)	49 (3.9)	31 (2.5)	1232
Females	842 (76.6)	154 (14)	69 (6.3)	35 (3.2)	1100
Pearson chi2(3)			121.2447		
p-value			<0.001		
Cramer's V			0.23		

Overall, participants watch stories or live stories posted by themselves less frequently: 1317 (56.8%) answered never, 475 (20.5%) rarely, 318 (13.7%) often, and 207 (8.9%) always.

Furthermore, overall, 891 (38.7%) respondents never "check the number of likes and visualizations of my videos or pictures"; 514 (22.3%), 457 (19.8%), 441 (19.2%) answered rarely, often, or always, respectively.

Lastly, 862 (37.3%) respondents never "check the number of likes and visualizations of my live stories"; 443 (19.2%), 467 (20.2%), 538 (23.3%) answered rarely, often, or always, respectively.

The results of the IACS scale concerning the active use of social networks, for males and females separately, are reported in Table 2.

The second part of the IACS scale dealt with the passive use of social networks with a particular attention to the interaction with peers. Results indicated that for the whole sample only 246 (10.6%) never watch peers' profiles, while 596 (25.7%), 1047 (45.1%), 432 (18.6%) declared to rarely, often, or always, watch peers' profiles, respectively.

Concerning the activity of "watching videos or pictures with me posted by peers", 655 (28.3%) answered never, 677 (29.3%) rarely, 677 (29.3%) and 303 (13.1%) always.

For the activity "watching videos or pictures posted by peers", 432 (18.7%) answered never, 772 (33.4%) rarely, 863 (37.3%) and 246 (10.6%) always.

Table 2. Frequency of activities regarding the active use of social networks by male and female participants, according to the Instagram Appearance Comparison Scale (IACS).

Activity	Frequency of Activity				
	Never	**Rarely**	**Often**	**Always**	**Total**
Sharing selfies or videos with me	n (%)	n (%)	n (%)	n (%)	n
Males	482 (40)	455 (37.7)	223 (18.5)	46 (3.8)	1206
Females	243 (22.2)	408 (37.3)	348 (31.8)	96 (8.8)	1095
Pearson chi2(3)			121.2447		
p-value			<0.001		
Cramer's V			0.23		
Me posting a live story					
Males	684 (56.4)	297 (24.5)	154 (12.7)	78 (6.4)	1213
Females	432 (39.3)	291 (26.5)	251 (22.8)	126 (11.5)	1100
Pearson chi2(3)			86.1758		
p-value			<0.001		
Cramer's V			0.19		
Me watching a live story					
Males	764 (62.9)	245 (20.2)	134 (11)	71 (5.9)	1214
Females	553 (50.1)	230 (20.9)	184 (16.7)	136 (12.3)	1103
Pearson chi2(3)			57.3648		
p-value			<0.001		
Cramer's V			0.16		
Me checking likes and number of visualizations of videos or pictures					
Males	520 (43)	263 (21.8)	230 (19)	196 (16.2)	1209
Females	371 (33.9)	251 (22.9)	227 (20.8)	245 (22.4)	1094
Pearson chi2(3)			24.9810		
p-value			<0.001		
Cramer's V			0.10		
Me checking likes and number of visualizations of live stories					
Males	559 (46.2)	220 (18.2)	222 (18.3)	210 (17.3)	1211
Females	303 (27.6)	223 (20.3)	245 (22.3)	328 (29.9)	1099
Pearson chi2(3)			97.8617		
p-value			<0.001		
Cramer's V			0.21		

Additionally, 469 (20.3%) participants never "watch peers' live stories" whereas 701 (30.3%), 845 (36.5%), 300 (13%) rarely, often, or often do this activity, respectively.

Furthermore, 719 (31.1%) of respondents never "like videos or pictures with me posted by peers"; 499 (21.6%), 555 (24%), 538 (23.3%) declared to rarely, often, or always, do this activity, respectively.

Regarding the activity "like videos or pictures posted by peers" 464 (20.1%) pre-teens declared to never do this activity, whereas 454 (19.6%), 793 (34.3%), 603 (26.1%) declared to rarely, often, or always, do this activity, respectively.

The last proposed activity dealing with the interaction with peers on social networks was "checking the number of likes and visualizations of peers' pictures and videos". From the results it emerged that the majority—1223 (52.8%)—never do this activity, while 696 (30.1%), 276 (11.9%), and 121 (5.2%) declared to rarely, often, or always do this activity, respectively.

The results of the IACS scale concerning the interaction with peers on social networks, for males and females separately, are reported in Table 3

Table 3. Frequency of activities regarding the interaction with peers on social networks by male and female participants, according to the Instagram Appearance Comparison Scale (IACS).

Activity	Frequency of Activity				
	Never	**Rarely**	**Often**	**Always**	**Total**
Watching peers' profiles	n (%)	n (%)	n (%)	n (%)	n
Males	165 (13.6)	356 (29.3)	521 (42.9)	172 (14.2)	1214
Females	81 (7.3)	240 (21.7)	526 (47.5)	260 (23.5)	1107
Pearson chi2(3)			64.4140		
p-value			<0.001		
Cramer's V			0.17		
Watching videos or pictures with me posted by peers					
Males	413 (34.1)	377 (31.1)	291 (24)	131 (10.8)	1212
Females	242 (22)	300 (27.3)	386 (35.1)	172 (15.6)	1100
Pearson chi2(3)			67.0109		
p-value			<0.001		
Cramer's V			0.17		
Watching videos or pictures posted by peers					
Males	260 (21.5)	413 (34.1)	429 (35.5)	108 (8.9)	1210
Females	172 (15.6)	359 (32.6)	434 (39.4)	138 (12.5)	1103
Pearson chi2(3)			20.4846		
p-value			<0.001		
Cramer's V			0.09		
Watching peers' live stories					
Males	290 (23.9)	383 (31.6)	400 (33)	141 (11.6)	1214
Females	179 (16.3)	318 (28.9)	445 (40.4)	159 (14.4)	1101
Pearson chi2(3)			30.3308		
p-value			<0.001		
Cramer's V			0.11		
Like videos or pictures with me posted by peers					
Males	469 (38.6)	264 (21.8)	242 (19.9)	239 (19.7)	1214
Females	250 (22.8)	235 (21.4)	313 (28.5)	299 (27.3)	1097
Pearson chi2(3)			78.4425		
p-value			<0.001		
Cramer's V			0.18		
Like videos or pictures posted by peers					
Males	297 (24.5)	272 (22.4)	385 (31.7)	259 (21.4)	1213
Females	167 (15.2)	182 (16.5)	408 (37.1)	344 (31.2)	1101
Pearson chi2(3)			61.6361		
p-value			<0.001		
Cramer's V			0.16		
Checking the number of likes and visualizations of peers' pictures and videos					
Males	651 (53.6)	345 (28.4)	147 (12.1)	71 (5.9)	1214
Females	572 (51.9)	351 (31.9)	129 (11.7)	50 (4.5)	1102
Pearson chi2(3)			4.5677		
p-value			0.21		

The last part of the IACS scale focused on the interaction with celebrities' profiles (passive use of social networks).

It emerged that 289 (12.5%) never watch celebrities' pictures or videos, 355 (15.4%) do this activity rarely; 849 (36.7%) and 819 (35.4%) often and always, respectively.

For the activity "watching celebrities' live stories" 418 (18.1%) respondents declared to never do this activity while 407 (17.6%), 753 (32.6%) and 730 (31.6%) rarely, often, or often do this activity, respectively.

The last question of the IACS scale was used to investigate how frequently pre-teens "like celebrities' pictures or videos". Overall, it emerged that 413 (17.9%), 479 (20.7%), 766 (33.2%), and 653 (28.3%) declared to never, rarely, often, and always do this activity, respectively.

The results of the IACS scale concerning the interaction with celebrities on social networks, for males and females separately, are reported in Table 4.

Table 4. Frequency of activities regarding the interaction with celebrities on social networks by male and female participants, according to the Instagram Appearance Comparison Scale (IACS).

Activity	Frequency of Activity				
	Never	**Rarely**	**Often**	**Always**	**Total**
Watching celebrities' pictures or videos	n (%)	n (%)	n (%)	n (%)	n
Males	165 (13.6)	158 (13.1)	473 (39.1)	415 (34.3)	1211
Females	124 (11.3)	197 (18)	376 (34.2)	404 (36.7)	1101
Pearson chi2(3)			16.1343		
p-value			<0.05		
Cramer's V			0.08		
Watching celebrities' live stories					
Males	242 (20)	207 (17.1)	399 (33)	363 (30)	1211
Females	176 (16)	200 (18.2)	354 (32.3)	367 (33.5)	1097
Pearson chi2(3)			7.6404		
p-value			0.054		
Like to celebrities' pictures or videos					
Males	229 (18.9)	248 (20.4)	415 (34.2)	322 (26.6)	1214
Females	184 (16.8)	231 (21.1)	351 (32)	331 (30.2)	1097
Pearson chi2(3)			24.9810		
p-value			<0.0010		
Cramer's V			0.10		

Overall, the effect sizes were small for all the statistically significant differences; however, only for the questions investigating the frequency of "taking several selfies and post the best" and "sending pictures or videos to friends for approval before posting" the effect sizes were moderate.

With regards to the physical activity levels, it emerged that overall, the PAQ-score resulted in 2.57 $\pm$ 0.70, with males reporting higher values (PAQ-score: 2.73 $\pm$ 0.7) than females (PAQ-score: 2.40 $\pm$ 0.66).

In order to explore body satisfaction in pre-teens, the Body Image State Scale was administered with a total of 1308 respondents (692 males). The first item of the questionnaire assesses the feelings of individuals regarding their physical appearance. From our sample the most common feelings were slightly/moderately satisfied (496; 39.9%) for both males (297; 59.9%) and females (199; 33.8%).

The second item of the BISS scale aimed to explore the feelings of individuals regarding their body size and shape. Also in this case, for the whole sample the most common feelings were slightly/moderately satisfied (463; 37.3%) for both males (270; 58.3%) and females (193; 41.7%).

Afterwards, the questionnaire focused on the feelings of individuals regarding their weight. Also in this case, for the whole sample the most common feelings were slightly/moderately satisfied (389; 31.3%). For males results were in line with the overall results (209; 53.7%) whereas for females lower scores were found, with the most common feeling being moderately/slightly dissatisfied with their weight (183; 48.9%).

Moreover, regarding the feelings about being physically attractive, results showed that for the whole sample the most common feeling was being slightly/moderately physically attractive (527; 42.7%) for both males (285; 54.1%) and females (242; 45.9%). Same results were found for the feeling about the looks (all: 583–47.2%; males: 322–55.3%; females: 261–44.8%).

The last item of the BISS scale explored the feelings of respondents compared to how their peers look. As for the third item of the questionnaire, for the whole sample the most common feelings resulted in being just slightly/somewhat better (476; 38.6%) than peers' looks. For males results were in line with the overall results (294; 61.8%) whereas for females lower scores were found, with the most common feeling being moderately/slightly dissatisfied with their weight (215; 53.4%).

On average the body satisfaction score was 2.5 ± 0.9, with a higher score for males (2.6 ± 0.9) than females (2.4 ± 0.8).

The last part of the present study aimed at investigating the dualism between the virtual and the real self. Results showed that, overall, 467 (46.4%) of respondents declared to have never thought about being in real life as themselves altered with beauty filters. Notwithstanding, the majority of female respondents (249; 62.1%) reported to have sometimes thought of being in real life as themselves with beauty filters. The same tendency was found regarding the question "Have you ever shared selfies or videos without beauty filters?". Considering the whole sample, 340 (33.7%) participants answered "No". Interestingly, most female respondents (198; 58.6%) declared to share selfies or videos without applying beauty filters sometimes, differently from the majority of males answering "No" (188; 55.3%).

Furthermore, it has been asked "have you ever used filters and apps to see how your body and appearance might look if modified in reality?". In this case the trend for females (311; 48.7%) and males (328; 51.3%) was in line with the results for the whole sample (639; 63.3%) answering "No". Coherently with this result, 872 (87.8%) of respondents declared to have never taken a survey on social media using a photo or video with a filter to decide whether to make changes to their physical appearance, in both males (413; 47.4%) and females (459; 52.6%).

On average the dualism score was 1.2 ± 0.8, with a higher score for females (1.4 ± 0.7) than females (1.1 ± 0.8).

From the LMMs for the whole sample, the estimated SD of the random intercepts was 0.85 AU (95% confidence interval [CI], 0.82/0.89); SE = 0.16; and R2 = 0.03. When the analysis was conducted only for the female sample, the estimated SD of the random intercepts was 0.85 AU (95% confidence interval [CI], 0.80/0.89); SE = 0.22; and R2 = 0.04; whereas, for the male sample, the estimated SD of the random intercepts was 0.85 AU (95% confidence interval [CI], 0.81/0.89); SE = 0.22; and R2 = −0.007.

Concerning the fixed part of the model, for the whole sample, for the dualism the slope was −0.96 AU (95% confidence interval [CI], −0.015/−0.04); SE = 0.03; $p < 0.001$), for physical activity levels the slope was 0.25 AU (95% confidence interval [CI], 0.19/0.31); SE = 0.03; $p < 0.001$) and the intercept was 1.98 AU (95% confidence interval [CI], 1.81/2.16); SE = 0.08; $p < 0.001$).

For the female sample, for the fixed part of the model the slope for the dualism was −0.13 AU (95% confidence interval [CI], −0.21/−0.04); SE = 0.04; $p < 0.05$), for physical activity levels the slope was 0.22 AU (95% confidence interval [CI], 0.13/0.30); SE = 0.04; $p < 0.001$) and the intercept was 2.08 AU (95% confidence interval [CI], 1.83/2.32); SE = 0.12; $p < 0.001$).

Concerning the fixed part of the model, for the male sample, for the dualism the slope was −0.04 AU (95% confidence interval [CI], −0.11/0.03); SE = 0.04; $p > 0.05$), for physical activity levels the slope was 0.22 AU (95% confidence interval [CI], 0.12/0.31); SE = 0.04; $p < 0.001$) and the intercept was 2.05 AU (95% confidence interval [CI], 1.80/2.30); SE = 0.13; $p < 0.001$).

4. Discussion

The present study aimed at investigating the influence of dualism and physical activity levels on pre-teens' body satisfaction, also in relation to gender. Results showed that the dualism negatively influences the body satisfaction whereas physical activity levels have

a positive influence, hereby representing a possible mediator for the detrimental effects induced by the exposure to the models proposed on image-centred social media platforms.

In modern societies, image-centred social media provide a novel context for the formation of identity, with their impact that still remains to be fully elucidated. In line with a previous study involving Australian preadolescents [45], social media use is nowadays normative despite the age limits to create social media accounts, with image-centred social media platforms (i.e., Instagram, SnapChat) being among the most used.

According to our model, the use of filters and dedicated apps to alter one's physical appearance with the view to build a better reputation on social media is negatively associated with body satisfaction, as previously supported [20,64].

The efforts to populate personal social media with selected images and videos and the pursuit for a higher social reputation among peers stimulate the use of filters and dedicated apps with the scope to adhere to sociocultural models that are considered desirable. Under these circumstances, pre-teens prefer to compare with peers in order to make cognitive judgments about their own appearance relative to others. Unstable identity commitment, insecurities and health-related problems are the potential negative consequences related to these behaviors [34,65,66]. Even though, social media might represent a supportive environments for young people [67], the present data showed how the continuous exposure to filtered images, combined with the increased interpersonal uncertainty experienced during the preadolescence, enhance the risk to open a gap between fiction and reality, and between the real body and the virtual representation of the body image.

Unsurprisingly, from the exploration of the active and passive use of social networks results showed that for all the proposed activities pre-teen females pose more attention to their appearance on social networks and they seek for appreciation more than males.

In fact, concerning body satisfaction, present results indicated that female pre-teens are less satisfied about their body shape, weight, or physical aspect than males. As a confirmation, from the exploration of dualism' phenomenon results showed that this condition is more pronounced among female pre-teens, underlying a higher gap between the virtual and the real self. Moreover, from the LMM analysis it emerged that the dualism significantly influenced females' body satisfaction in a negative trend, differently from male participants where this relationship was not statistically significant. Accordingly, Fardouly et al. [45] suggested that social media appearance comparisons might lead to negative mental health issues, depressive symptoms, body satisfaction, or eating pathologies, with an enhanced effect on girls.

Effectively, it is not new that social media filters and beauty images might affect self-esteem and the perception of body image, especially among young women [21]. Moreover, unrealistic beauty standards may cause insecurity about the physical aspect, inducing the use of beauty filters to hide imperfections and photoshop their bodies, and to make comparisons with others social media users [21]. In this context, peers are characterized by several roles such as imaginary audiences, judges, vicarious learning sources, and comparison targets in shaping teenage girls' perceptions and presentation of beauty [40].

Furthermore, physical activity represents a valid tool to face stressful situations [8,68]; also, participation in physical and sport activities is related to a less negative and more positive body image [49].

Therefore, for the present study it was hypothesized that the dualism between the real and the virtual identity induced by a massive use of social media platforms might induce negative effects on body satisfaction among Italian pre-teens. In addition, it was also hypothesized that an active lifestyle could act as a positive mediator toward the detrimental effects of beauty standards promoted on image-centered social media platforms.

In fact, a previous study demonstrated that sport or a physical activity session might exert a positive effect on an individual's body image perception [57].

In this light, a recent study [69] investigated moderators of associations from social media use to changes in body satisfaction and physical activity among children and pre-teens. Results indicated that higher social media use was associated with greater subsequent

decreases in body satisfaction and physical activity, but only for children high on susceptibility to peer influence, underlying the fact that peer conformity amplifies the risks of social media use.

Broadly, the investigated sample can be classified as non-active, according to the classification values for Italian for the PAQ-C questionnaire [70].

Nevertheless, many factors should be considered for the adoption of active lifestyles. For instance, Zhang et al. [70] investigated the predictive strengths of individual, social, and physical environmental factors toward different intensities of physical activity and sedentary behaviors. Results showed the variables such as self-efficacy, social support from friends, or convenience of using exercise facilities were positively correlated with vigorous physical activity.

In this regard, the promotion of physical activity as part of preadolescents' daily routine may be considered as a strategy to contrast the negative effects on body image related to the type of social media use.

5. Limitations and Future Research

Concerning the study, several limitations must be taken into consideration. The study was based on a cross-sectional approach. Thus, causality or direction cannot be assumed. A second limitation is related to the measurement of the type of social media engagement, and to the capacity of the research tools to clearly describe the types of interaction through social media. Pre-teens can compare themselves to others on social media in a variety of different domains (e.g., numbers of followers, sport experience, etc.), which may also be linked to body image concerns. Finally, the sample used in this study consisted of a homogenous group of public-school Italian students with a common cultural background. Future research could examine whether the same associations are evident amongst different cultural groups.

6. Conclusions

Considered in broad terms, the study has both theoretical and practical implications. In terms of theoretical implications, the results are expected to further clarify the nature of sociocultural influences on pre-teens' body image. The study is also expected to contribute to further understanding the influence of an active lifestyle on the individuals' quality of life. Furthermore, the analysis of the processes that determine the formation of the body image are regarded to provide a better insight into the profound human experiences of embodiment.

In terms of practical implications, the study suggests that pre-teens who report a higher propensity to manipulate their physical appearance and to have image-centred active and passive interactions on social media are at a greater risk for developing body image problems and concerns. However, pre-teens may benefit from the adoption of an active lifestyle. In these terms, it must also be highlighted the importance of the protective role of the school in which an appropriate conversation about media models and active lifestyles should be promoted with the view to reduce misconceptions about the self-perception of the body. In particular, the engagement of preadolescents in offline activities that promote a positive sociocultural model about the body and foster an active lifestyle may increase their social skills and reduce the negative effect of social media use. It might also help to reduce the dualism between the virtual and the real body. Broadly, it is emerging the need to rethink the mechanisms of control that should prevent pre-teens and children from using social media and apps that are not intended for them. Unless the age limits are clearly set in many countries, the application of the limitations appears to be ineffective.

In the future, in order to develop goal-oriented and effective interventions there is the need to further investigate how social media engagement impacts body image, among which preadolescents this effect occurs most strongly, and under which conditions the effects come about.

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References

1. Hughes, E.K.; Mundy, L.K.; Romaniuk, H.; Sawyer, S.M.; Wake, M.; Williams, J.; Olds, T.; Allen, N.B.; Patton, G.C. Body image dissatisfaction and the adrenarchal transition. *J. Adolesc. Health* **2018**, *63*, 621–627. [CrossRef] [PubMed]
2. Evans, E.H.; Adamson, A.J.; Basterfield, L.; Le Couteur, A.; Reilly, J.K.; Reilly, J.J.; Parkinson, K.N. Risk factors for eating disorder symptoms at 12 years of age: A 6-year longitudinal cohort study. *Appetite* **2017**, *108*, 12–20. [CrossRef] [PubMed]
3. Fardouly, J.; Vartanian, L.R. Social media and body image concerns: Current research and future directions. *Curr. Opin. Psychol.* **2016**, *9*, 1–5. [CrossRef]
4. McCrae, N.; Gettings, S.; Purssell, E. Social media and depressive symptoms in childhood and adolescence: A systematic review. *Adolesc. Res. Rev.* **2017**, *2*, 315–330. [CrossRef]
5. Livingstone, S.; Mascheroni, G.; Murru, M.F.; Thierry, A. Social networking among European children: New findings on privacy, identity and connection. *Hermes* **2011**, *59*, 89. [CrossRef]
6. Rideout, V.; Fox, S.; Digital Health Practices, Social Media Use, and Mental Well-Being among Teens and Young Adults in the U.S. Artic. *Abstr. Rep.* 2018. Available online: https://digitalcommons.psjhealth.org/cgi/viewcontent.cgi?article=2092&context=publications (accessed on 6 December 2022).
7. Smahel, D.; Zlamal, R.; Machackova, H.; Olafsson, K.; Staksrud, E. *EU Kids Online 2020: Technical Report*; EU Kids Online: London, UK, 2020. [CrossRef]
8. Digennaro, S.; Iannaccone, A. Being a docile body: The effects on preadolescents of the social restrictions imposed during COVID-19. *Contemp. Soc. Sci.* **2023**, *1*, 1–19. [CrossRef]
9. Cash, T.; Smolak, L. *Body Image: A Handbook of Science, Practice, and Prevention*, 2nd ed.; Guilford Press: New York, NY, USA, 2011; ISBN 1609181840, 9781609181840.
10. Smolak, L.; Thompson, J.K. *Body Image, Eating Disorder, and Obesity in Youth*, 2nd ed.; Smolak, L., Thompson, J.K., Eds.; American Psychological Association: Washington, DC, USA, 2009; ISBN 978-1-4338-0405-2.
11. Cash, T. *Encyclopedia of Body Image and Human Appearance*; Academic Press: Cambridge, MA, USA, 2012; ISBN 0123849268.
12. Byrne, L. Neuroscientific perspectives on body image. In *Encyclopedia of Body Image and Human Appearance*; Elsevier: London, UK, 2012; pp. 568–573.
13. Digennaro, S. The body and its duplications: The impact of the use of social media on preadolescents' body image. *Ital. J. Health Educ. Sport. Incl. Didact.* **2022**, *6*, 1–8. [CrossRef]
14. Thompson, J.K.; Coovert, M.D.; Stormer, S.M. Body image, social comparison, and eating disturbance: A covariance structure modeling investigation. *Int. J. Eat. Disord.* **1999**, *26*, 43–51. [CrossRef]
15. Shroff, H.; Thompson, J.K. The tripartite influence model of body image and eating disturbance: A replication with adolescent girls. *Body Image* **2006**, *3*, 17–23. [CrossRef]
16. Smolak, L.; Murnen, S.K.; Thompson, J.K. Sociocultural influences and muscle building in adolescent boys. *Psychol. Men Masc.* **2005**, *6*, 227–239. [CrossRef]
17. van den Berg, P.; Thompson, J.K.; Obremski-Brandon, K.; Coovert, M. The Tripartite Influence model of body image and eating disturbance. *J. Psychosom. Res.* **2002**, *53*, 1007–1020. [CrossRef] [PubMed]
18. Giddens, A. Modernitetens konsekvenser. In *The Consequences of Modernity*; Pax Forlag: Oslo, Norway, 1997; ISBN 0745609236.
19. Eyal, K.; Te'eni-Harari, T. Explaining the relationship between media exposure and early adolescents' body image perceptions. *J. Media Psychol.* **2013**, *25*, 129–141. [CrossRef]

20. Tatangelo, G.L.; Ricciardelli, L.A. Children's body image and social comparisons with peers and the media. *J. Health Psychol.* **2017**, *22*, 776–787. [CrossRef]
21. Eshiet, J. "Real me versus social media me": Filters, Snapchat Dysmorphia and Beauty Perceptions among Young Women. Master's Thesis, California State University, San Bernardino, CA, USA, 2020; pp. 16–93.
22. Schaefer, L.M.; Burke, N.L.; Thompson, J.K.; Dedrick, R.F.; Heinberg, L.J.; Calogero, R.M.; Bardone-Cone, A.M.; Higgins, M.K.; Frederick, D.A.; Kelly, M.; et al. Development and validation of the Sociocultural Attitudes Towards Appearance Questionnaire-4 (SATAQ-4). *Psychol. Assess.* **2015**, *27*, 54–67. [CrossRef]
23. Thompson, J. *Body Image Disturbance: Assessment and Treatment*; Pergamon Press: Oxford, UK, 1990.
24. Foucault, M. *Discipline and Punish: The Birth of The Prison*; Random House of Canada Limited: Toronto, ON, Canada, 1995; ISBN 0679752552.
25. Foucault, M. *Hétérotopies: Le Corps Utopique*; Suhrkamp: Berlin, Germany, 2005.
26. Sæle, O.O.; Sæther, I.K.; Viig, N.G. The ideal body: A social construct? Reflections on body pressure and body ideal among students in upper secondary school. *Front. Sport. Act. Living* **2021**, *3*, 727502. [CrossRef]
27. Floridi, L. *The Fourth Revolution: How the Infosphere is Reshaping Human Reality*, 2014 ed.; Oxford University Press: Oxford, UK, 2014; ISBN 0191667692.
28. Rousseau, A.; Rodgers, R.F.; Eggermont, S. A biopsychosocial model for understanding media internalization and appearance dissatisfaction among preadolescent boys and girls. *Communic. Res.* **2020**, *47*, 346–372. [CrossRef]
29. Griffiths, S.; Murray, S.B.; Krug, I.; McLean, S.A. The contribution of social media to body dissatisfaction, eating disorder symptoms, and anabolic steroid use among sexual minority men. *Cyberpsychol. Behav. Soc. Netw.* **2018**, *21*, 149–156. [CrossRef]
30. Meier, E.P.; Gray, J. Facebook photo activity associated with body image disturbance in adolescent girls. *Cyberpsychol. Behav. Soc. Netw.* **2014**, *17*, 199–206. [CrossRef]
31. Rodgers, R.F.; Rousseau, A. Social media and body image: Modulating effects of social identities and user characteristics. *Body Image* **2022**, *41*, 284–291. [CrossRef]
32. Rideout, V.; Peebles, A.; Mann, S.; Robb, M.B. *The Common Sense Census: Media Use by Tweens and Teens 2021*; Common Sense Media: San Francisco, CA, USA, 2022.
33. Fardouly, J.; Magson, N.R.; Johnco, C.J.; Oar, E.L.; Rapee, R.M. Parental control of the time preadolescents spend on social media: Links with preadolescents' social media appearance comparisons and mental health. *J. Youth Adolesc.* **2018**, *47*, 1456–1468. [CrossRef]
34. Holland, G.; Tiggemann, M. A systematic review of the impact of the use of social networking sites on body image and disordered eating outcomes. *Body Image* **2016**, *17*, 100–110. [CrossRef] [PubMed]
35. Fabian, L.J.; Thompson, J.K. Body image and eating disturbance in young females. *Int. J. Eat. Disord.* **1989**, *8*, 63–74. [CrossRef]
36. Klump, K.L. Puberty as a critical risk period for eating disorders: A review of human and animal studies. *Horm. Behav.* **2013**, *64*, 399–410. [CrossRef] [PubMed]
37. Festinger, L. A Theory of social comparison processes. *Hum. Relations* **1954**, *7*, 117–140. [CrossRef]
38. Vani, M.; Murray, R.; Sabiston, C. Body image and physical activity. In Essentials of Exercise and Sport Psychology: An Open Access Textbook; Society for Transparency, Openness, and Replication in Kinesiology, 2021, pp. 150–175. Available online: https://www.researchgate.net/publication/352377834_Body_image_and_physical_activity (accessed on 6 December 2022).
39. Tiggemann, M.; Barbato, I. "You look great!": The effect of viewing appearance-related Instagram comments on women's body image. *Body Image* **2018**, *27*, 61–66. [CrossRef]
40. Chua, T.H.H.; Chang, L. Follow me and like my beautiful selfies: Singapore teenage girls' engagement in self-presentation and peer comparison on social media. *Comput. Human Behav.* **2016**, *55*, 190–197. [CrossRef]
41. Tiggemann, M.; Polivy, J. Upward and downward: Social comparison processing of thin idealized media images. *Psychol. Women Q.* **2010**, *34*, 356–364. [CrossRef]
42. Meshi, D.; Morawetz, C.; Heekeren, H.R. Facebook, being cool, and your brain: What science tells us. *Front. Young Minds* **2013**, *1*, 1–5. [CrossRef]
43. Jang, J.Y.; Han, K.; Shih, P.C.; Lee, D. Generation Like: Comparative characteristics in Instagram. In Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems; ACM: New York, NY, USA, 2015; pp. 4039–4042.
44. Kleemans, M.; Daalmans, S.; Carbaat, I.; Anschütz, D. Picture perfect: The direct effect of manipulated Instagram photos on body image in adolescent girls. *Media Psychol.* **2018**, *21*, 93–110. [CrossRef]
45. Fardouly, J.; Magson, N.R.; Rapee, R.M.; Johnco, C.J.; Oar, E.L. The use of social media by Australian preadolescents and its links with mental health. *J. Clin. Psychol.* **2020**, *76*, 1304–1326. [CrossRef]
46. Paxton, S.J.; Neumark-Sztainer, D.; Hannan, P.J.; Eisenberg, M.E. Body dissatisfaction prospectively predicts depressive mood and low self-esteem in adolescent girls and boys. *J. Clin. Child Adolesc. Psychol.* **2006**, *35*, 539–549. [CrossRef] [PubMed]
47. Sharpe, H.; Patalay, P.; Choo, T.-H.; Wall, M.; Mason, S.M.; Goldschmidt, A.B.; Neumark-Sztainer, D. Bidirectional Associations between body dissatisfaction and depressive symptoms from adolescence through early adulthood. *Dev. Psychopathol.* **2018**, *30*, 1447–1458. [CrossRef] [PubMed]
48. Fernández-Bustos, J.G.; Infantes-Paniagua, Á.; Cuevas, R.; Contreras, O.R. Effect of physical activity on self-concept: Theoretical model on the mediation of body image and physical self-concept in adolescents. *Front. Psychol.* **2019**, *10*, 1537. [CrossRef] [PubMed]

49. Sabiston, C.M.; Pila, E.; Vani, M.; Thogersen-Ntoumani, C. Body image, physical activity, and sport: A scoping review. *Psychol. Sport Exerc.* **2019**, *42*, 48–57. [CrossRef]
50. Engberg, E.; Leppänen, M.H.; Sarkkola, C.; Viljakainen, H. Physical activity among preadolescents modifies the long-term association between sedentary time spent using digital media and the increased risk of being overweight. *J. Phys. Act. Health* **2021**, *18*, 1105–1112. [CrossRef]
51. Rutter, L.A.; Thompson, H.M.; Howard, J.; Riley, T.N.; De Jesús-Romero, R.; Lorenzo-Luaces, L. Social media use, physical activity, and internalizing symptoms in adolescence: Cross-sectional analysis. *JMIR Ment. Health* **2021**, *8*, e26134. [CrossRef]
52. Jankauskiene, R.; Baceviciene, M.; Trinkuniene, L. Examining body appreciation and disordered eating in adolescents of different sports practice: Cross-sectional study. *Int. J. Environ. Res. Public Health* **2020**, *17*, 4044. [CrossRef]
53. Marengo, D.; Longobardi, C.; Fabris, M.A.; Settanni, M. Highly-visual social media and internalizing symptoms in adolescence: The mediating role of body image concerns. *Comput. Hum. Behav.* **2018**, *82*, 63–69. [CrossRef]
54. Di Gesto, C.; Matera, C.; Nerini, A.; Policardo, G.R.; Stefanile, C. Measure the activities related to images and appearance comparison on Instagram: Validation of the instagram image activity scale and the instagram appearance comparison scale. *Psicol. della Salut.* **2020**, *3*, 109–128. [CrossRef]
55. Cash, T.; Fleming, E.; Alindogan, J.; Steadman, L.; Whitehead, A. Beyond Body Image as a trait: The development and validation of the body image states scale. *Eat. Disord.* **2002**, *10*, 103–113. [CrossRef]
56. Carraro, A.; Nart, A.; Scarpa, S. Effects of a single session of physical exercise on body state image. *Rev. Bras. Ciências do Esporte* **2010**, *32*, 173–184. [CrossRef]
57. Gobbi, E.; Elliot, C.; Varnier, M.; Carraro, A. Psychometric properties of the physical activity questionnaire for older children in Italy: Testing the validity among a general and clinical pediatric population. *PLoS ONE* **2016**, *11*, e0156354. [CrossRef]
58. Kowalski, K.C.; Crocker, P.R.E.; Donen, R.M. The physical activity questionnaire for older children (PAQ-C) and adolescents (PAQ-A) manual. *Coll. Kinesiol. Univ. Saskatchewan* **2004**, *87*, 1–38.
59. O'Donoghue, P. *Statistics for Sport and Exercise Studies: An Introduction*; Routledge: New York, NY, USA, 2013; pp. 1–392. [CrossRef]
60. Cramer, H. *Mathematical Methods of Statistics (PMS-9)*; Princeton University Press: Princeton, NJ, USA, 1999; Volume 9.
61. Atkinson, G.; Batterham, A.M.; Jones, H.; Taylor, C.E.; Willie, C.K.; Tzeng, Y.-C. Appropriate within-subjects statistical models for the analysis of baroreflex sensitivity. *Clin. Physiol. Funct. Imaging* **2011**, *31*, 80–82. [CrossRef]
62. Iannaccone, A.; Conte, D.; Cortis, C.; Fusco, A. Usefulness of linear mixed-effects models to assess the relationship between objective and subjective internal load in team sports. *Int. J. Environ. Res. Public Health* **2021**, *18*, 392. [CrossRef]
63. Jones, D.C.; Vigfusdottir, T.H.; Lee, Y. Body image and the appearance culture among adolescent girls and boys. *J. Adolesc. Res.* **2004**, *19*, 323–339. [CrossRef]
64. Steers, M.-L.N. 'It's complicated': Facebook's relationship with the need to belong and depression. *Curr. Opin. Psychol.* **2016**, *9*, 22–26. [CrossRef]
65. Tremblay, S.C.; Essafi Tremblay, S.; Poirier, P. From filters to fillers: An active inference approach to body image distortion in the selfie era. *AI Soc.* **2021**, *36*, 33–48. [CrossRef]
66. Kysnes, B.; Haug, E.; Holsen, I.; Johnsen Hjetland, G.; Skogen, J.C. The association between sharing something difficult on social media and mental well-being among adolescents. *Front. Psychol.* **2022**, *13*, 7514. [CrossRef]
67. Iannaccone, A. Physical activity for a positive coping during stressful situations: An action research. *Ital. J. Health Educ. Sport. Incl. Didact.* **2022**, *6*, 1–10. [CrossRef]
68. Leggett-James, M.P.; Laursen, B. The consequences of social media use across the transition into adolescence: Body image and physical activity. *J. Early Adolesc.* **2022**, 027243162211360. [CrossRef]
69. Lupo, C.; Boccia, G.; Ungureanu, A.N.; Mulasso, A.; De Pasquale, P.; Mancini, A.; Buono, P.; Rainoldi, A.; Brustio, P.R. The Cut-Off value for classifying active Italian children using the corresponding national version of the physical activity questionnaire. *Sports* **2022**, *10*, 61. [CrossRef] [PubMed]
70. Zhang, T.; Lee, J.; Zhang, X.; Gu, X. Social-ecological factors predict college students' physical activities and sedentary behavior. *Sustainability* **2022**, *14*, 12873. [CrossRef]