

ORIGINAL RESEARCH

Misalignment among adolescents living with obesity, caregivers, and healthcare professionals: ACTION Teens global survey study

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Summary

Background: There is limited evidence regarding the experiences, challenges, and needs of adolescents living with obesity (ALwO), their caregivers, and healthcare professionals (HCPs).

Objectives: The cross-sectional, survey-based global ACTION Teens study aimed to identify perceptions, attitudes, behaviours, and barriers to effective obesity care among ALwO, caregivers of ALwO, and HCPs.

Methods: ALwO (aged 12 to <18 years; $N = 5275$), caregivers ($N = 5389$), and HCPs treating ALwO ($N = 2323$) from 10 countries completed an online survey (August–December 2021).

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Results: Most ALwO perceived their weight as above normal (76% vs. 66% of caregivers), were worried about its impact on their health (85% vs. 80% of caregivers), and recently made a weight loss attempt (58%). While 45% of caregivers believed ALwO would slim down with age, only 24% of HCPs agreed. Most commonly reported weight loss motivators for ALwO were wanting to be more fit/in better shape according to ALwO (40%) and caregivers (32%), and improved confidence/social life according to HCPs (69%). ALwO weight loss barriers included lack of hunger control (most commonly reported by ALwO/caregivers), lack of motivation, unhealthy eating habits (most commonly agreed by HCPs), and lack of exercise.

Conclusions: Misalignment between ALwO, caregivers, and HCPs—including caregivers' underestimation of the impact of obesity on ALwO and HCPs' misperception of key motivators/barriers for weight loss—suggests a need for improved communication and education.

KEYWORDS

adolescents, clinical care, family practice, obesity treatment, physician attitudes

1 | INTRODUCTION

Obesity in children and adolescents has increased in most countries in recent years.¹ Between 1975 and 2016, the global prevalence of obesity among children/adolescents aged 5–19 years increased from 0.7% to 5.6% for girls and from 0.9% to 7.8% for boys.¹

Obesity in adolescence is likely to persist into adulthood and has a more severe lifelong impact than adult-onset obesity.^{2–4} Adolescents with metabolic syndrome, which includes overweight/obesity, have an increased risk of type 2 diabetes and high carotid intima-media thickness in adulthood.⁵ Obesity is also associated with a substantial mental health burden for children and adolescents living with obesity (ALwO), with an increased risk of comorbidities such as depression, anxiety, and low self-esteem.^{6–8} Early intervention is indicated in ALwO, as younger age at the time of intervention is associated with a better long-term outcome,⁹ and even modest body mass index (BMI) reductions in children and ALwO are associated with reduced cardiometabolic risk.¹⁰

Despite the increasing prevalence of adolescent obesity, there is limited evidence regarding the experiences, challenges, and needs of ALwO, their caregivers, and the healthcare professionals (HCPs) who treat them. In one descriptive analysis of interviews with adolescents with severe obesity and their mothers, conflicting perceptions of some weight management issues were found to exist between the two groups, particularly surrounding responsibility for exercise initiation, motivation, and maintenance.¹¹ The findings from this small US analysis suggest there may be areas where ALwO and their caregivers are misaligned regarding obesity care and management. There is also a tendency for parents/caregivers to underestimate the overweight status of their child, potentially hindering effective management of ALwO.^{12,13}

A previous international survey-based study that evaluated attitudes, perceptions, and behaviours surrounding obesity in adults with obesity and HCPs found there is a delay in the initiation of weight management conversations by HCPs, with conversations most frequently initiated due to obesity-related complications.¹⁴ This suggests there is a need to initiate weight management conversations earlier, before obesity-related complications occur. The survey also highlighted a need for education of both adults with obesity and HCPs regarding the biology and clinical management of obesity. Similar evidence for ALwO, their caregivers, and treating HCPs is currently lacking.

The global ACTION Teens study aimed to identify perceptions, attitudes, behaviours, and barriers to effective obesity care across ALwO, caregivers of ALwO, and HCPs, to generate insights that can inform improvements in obesity management for ALwO.

2 | METHODS

2.1 | Study design and participants

ACTION Teens was a multinational, cross-sectional, survey-based study. Data were collected by a third-party vendor (KJT Group Inc., Rochester, NY, USA) through existing databases/panels in 10 countries (Australia, Colombia, Italy, Mexico, Saudi Arabia, South Korea, Spain, Taiwan, Turkey, and the United Kingdom) from August 23 to December 13, 2021.

Eligible ALwO were aged 12 to <18 years, lived in a participating country, and had a current BMI-for-age (based on self-reported sex, age, height, and weight) \geq 95th percentile for age and sex based on locally appropriate charts for the country of residence. Eligible caregivers were aged \geq 25 years, lived with an ALwO (in a participating

country) $\geq 50\%$ of the time, and were involved in the ALwO's health-care decisions. HCPs were eligible if they were practicing in a participating country, had been in clinical practice for ≥ 2 years, spent $\geq 50\%$ of their time in direct patient care, and treated ≥ 10 ALwO in a typical month. ALwO (and consequently their caregivers) were excluded if they had significant weight loss/gain due to major injury/illness in the past 6 months, or if they indicated during the screening that they considered themselves (or their child in the case of caregivers) to be "extremely muscular".

The study was approved by an independent ethics committee/institutional review board (IEC/IRB) for each participating country or a centralized IEC/IRB (see Supplementary Methods for details [Data S1]). All respondents (and the parent/legal guardian of ALwO) provided electronic informed consent for study participation.

The study was conducted in accordance with the principles of the Declaration of Helsinki, EphMRA Code of Conduct,¹⁵ and with applicable laws and regulations regarding the management of personal information, and is registered with [ClinicalTrials.gov](https://www.clinicaltrials.gov) (NCT05013359).

2.2 | Survey development

Separate but overlapping questionnaires were developed for this study: one each for ALwO, caregivers, and HCPs (see Data S1). The survey materials were co-developed and approved by an international external steering committee consisting of HCPs and content experts. For further details, see the Supplementary Methods (Data S1).

2.3 | Procedures

Data collection and reporting were overseen by KJT Group. Data were collected through an online survey programmed using Decipher Survey Software (FocusVision Worldwide Inc.). Respondents were recruited via online panels/databases, with recruitment conducted via email where possible. To yield a natural fall-out of ALwO in the absence of specific demographic targets for adolescents in each country, ALwO and caregivers were recruited from a general population sample of adults aged ≥ 25 years to identify caregivers of ALwO, and ALwO were recruited via their caregivers. To ensure the qualifying sample was largely representative of the adult population in each country, the targeted sample was stratified to match general population demographic targets based on sex, age, income, education, race/ethnicity (included for Australia only), and region. The general population targets were gathered from government data for each country, where possible. To maximize the number of "matched pairs" of caregivers and ALwO, all verified caregivers were asked for permission for their ALwO to participate; once the matched pairs recruitment had been maximized, caregivers and ALwO continued to be recruited to obtain the desired numbers of participants.

Surveys were provided in each country's native language and completed online by the respondent (or via computer-assisted

telephone/in-person interviews in select countries). To prevent unauthorized access to the survey, the invitation to participate (see Data S1) provided a unique survey link that was only accessible to the recipient. The ALwO/caregiver-specific surveys were accessible via a single link that was sent to caregivers, while ALwO who were contacted directly received their own survey link. Respondents were asked to complete screening questions to assess eligibility; only eligible respondents could proceed to the survey, and each survey could only be completed once. Surveys were programmed so that all questions were compulsory, eliminating the risk of missing data for completed surveys. Bias was minimized by generalizing the topic of the survey in the invitations and via carefully designed screening questions.

Further details on procedures are provided in the Supplementary Methods (Data S1).

2.4 | Outcomes

Primary outcome measures included: attitudes about obesity and people with obesity, and beliefs about the impact of obesity; weight loss attempts in the past year, motivations and barriers to losing weight, and definition of successful weight loss/management; history and frequency of conversations about weight, initiator of weight conversations, and responsibility for initiating weight conversations that occur between ALwO/caregivers and HCPs; assessment of interactions between ALwO/caregivers and HCPs, reasons why obesity may not be discussed, frequency of obesity diagnosis, and frequency of follow-up appointments to discuss obesity; and sources of information used to learn about obesity, healthy lifestyles, weight loss, and weight management. Outcomes measures were assessed using yes/no responses, 5-point Likert scales, numeric responses, or single/multiple item selection, as appropriate.

Exploratory outcomes (see Supplementary Methods [Data S1]) will be reported separately.

2.5 | Sample size

The target sample size was 14 600 completed surveys (6150 ALwO [450–1000 per country]; 6150 caregivers [450–1000 per country]; and 2300 HCPs [150–300 per country]). Sample sizes were selected to balance statistical power and recruitment feasibility (see Supplementary Methods for further details [Data S1]).

2.6 | Statistical analysis

Analysis of de-identified data was conducted by KJT Group using SPSS (IBM, version 23.0), Stata (StataCorp LLC, version IC 14.2), and Excel (Microsoft 365). All respondents who completed the survey were included in the full analysis set. Data were summarized using univariate descriptive statistics (means, medians, and proportions).

Outliers for continuous variables were truncated to the median as appropriate, and determined on a case-by-case basis.

To mitigate selection bias and for generalizability, caregiver data were weighted to representative demographic targets within each country (for age, sex, household income, education, and region); see Supplementary Methods for details (Data S1).

3 | RESULTS

3.1 | Participant characteristics

Overall, 5275 ALwO, 5389 caregivers, and 2323 HCPs were surveyed (Figure S1), which, for ALwO and caregivers, was lower than the target sample size. The HCP response rate was 13.7%; it was not possible to calculate the ALwO and caregiver response rates due to the recruitment methods (see Supplementary Methods [Data S1]).

The demographics and characteristics of respondents are summarized in Tables 1 and S1. The HCPs' ALwO patient population and the ALwO surveyed appeared to have a similar obesity class distribution (Table 1).

HCPs' background and experience with ALwO are reported in Table S2. Overall, 43% of HCPs reported receiving advanced training in obesity/weight management; however, only 13% had completed

more than 1 day of advanced training with certification/evaluation (Figure S2). Most HCPs were aware of clinical treatment guidelines for ALwO (67%); among this subset, most indicated that the guidelines were somewhat/very effective (75%).

3.2 | Information sources

For ALwO, YouTube was the most commonly used and most important source of information about weight management (used by 34% of ALwO; most important source for 15% of ALwO), whereas for caregivers it was doctors (used by 32% of caregivers; most important source for 22% of caregivers) (Figure S3). HCP information sources are shown in Figure S3C.

3.3 | Perceptions of obesity

A substantial proportion of ALwO and caregivers thought it would be harder for a person with excess weight to get a job (50% and 52%), make friends (45% and 43%), and do well in school (33% and 30%) than a person without excess weight.

HCPs were the most likely group to indicate that obesity had a strong impact on a person's overall health and wellbeing (89%), followed by ALwO (72%), then caregivers (67%). Most respondents felt

TABLE 1 Demographics and characteristics

	ALwO	Caregivers	HCPs
Full global sample, N	5275	5389	2323
Matched pair (ALwO and caregiver), n (%)	933 (18)	933 (17)	N/A
Unmatched, n (%)	4342 (82)	4456 (83)	N/A
Age in years, mean (SD)	14.8 (1.7)	40.9 (8.6)	45.0 (10.7)
Female, n (%)	2304 (44)	2781 (52)	919 (40)
BMI classification of ALwO ^a			
Obesity Class I	65% (n = 3434)	62% (n = 3324)	58% (SD: 21.4)
Obesity Class II	21% (n = 1128)	23% (n = 1242)	27% (SD: 13.0)
Obesity Class III	14% (n = 713)	15% (n = 823)	15% (SD: 12.9)
BMI classification of caregivers and HCPs, ^{b,c} n (%)			
Underweight (<18.5 kg/m ²)	N/A	141 (3)	46 (3)
Healthy weight (18.5–24.9 kg/m ²)	N/A	2030 (38)	1023 (58)
Overweight (25–29.9 kg/m ²)	N/A	1997 (37)	561 (32)
Obesity Class I–III (≥30 kg/m ²)	N/A	1221 (23)	138 (8)

Abbreviations: ALwO, adolescents living with obesity; BMI, body mass index; HCP, healthcare professional; N/A, not applicable; SD, standard deviation.

^aBMI classification for recruited ALwO, the ALwO of recruited caregivers, and the ALwO treated by recruited HCPs (Obesity Class I = BMI ≥95th percentile for age and sex; Obesity Class II = BMI ≥120% of 95th percentile for age and sex; Obesity Class III = BMI ≥140% of 95th percentile for age and sex). ALwO and caregiver data are the percentage (number) of ALwO in each BMI category; HCP data are the mean percentage (SD) of their ALwO patients in each BMI category.

^bBMI classification of recruited caregivers and HCPs (n = 1768 for HCP BMI classification).

^cThe BMIs of caregivers and HCPs were categorized according to the BMI ranges shown in the table, rather than by the definition of underweight, healthy weight, overweight, or obesity in their country. For South Korea and Taiwan, obesity classes are: "Obesity Class 1" (same as "Overweight" in other countries, BMI range starting at 25.0 for South Korea and 27.0 for Taiwan); "Obesity Class 2" (same as "Obesity Class I" in other countries); and "Obesity Class 3" (same as "Obesity Class II and III" in other countries).

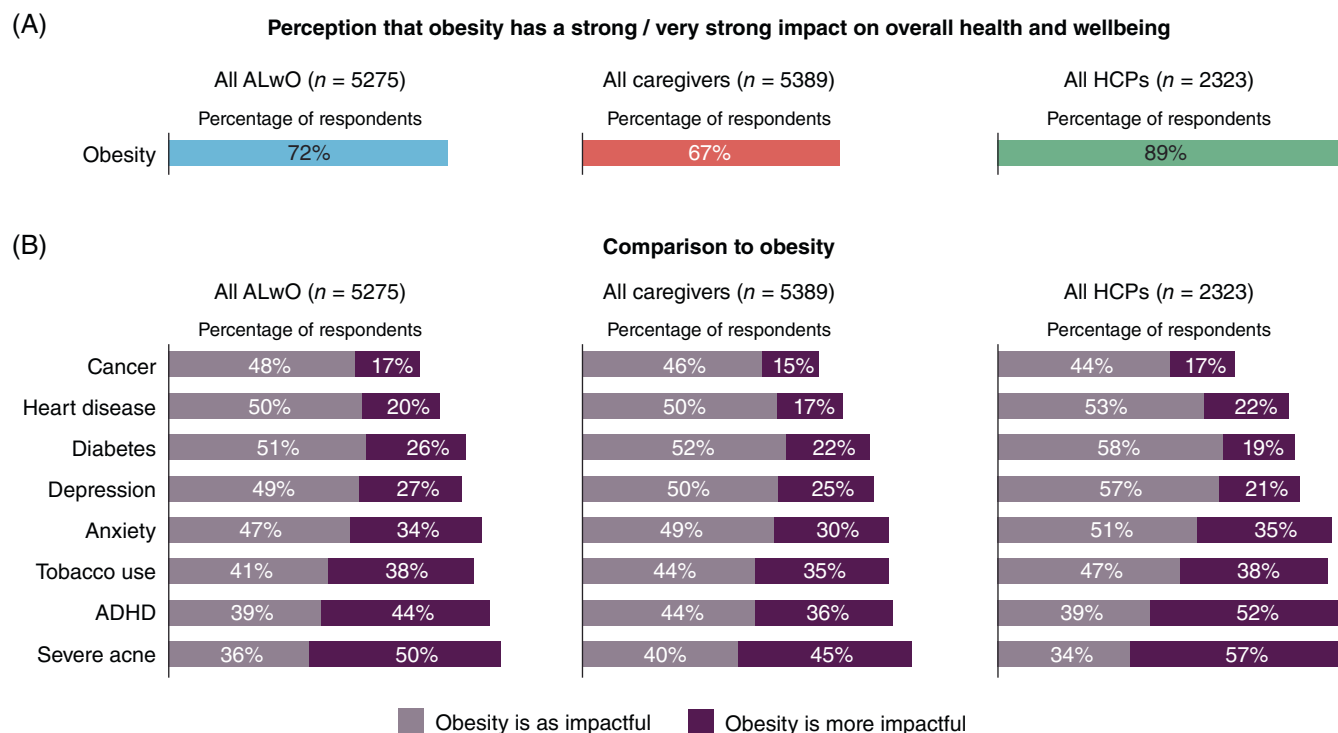


FIGURE 1 ALwO, caregiver, and HCP perceived impact of obesity on overall health and wellbeing: (A) impact of obesity and (B) impact of obesity versus other health conditions. ADHD, attention deficit hyperactivity disorder; ALwO, adolescents living with obesity; HCP, healthcare professional. Participants were asked how much of an impact they thought various conditions have on a person's overall health and wellbeing—the scale for the question was 1 = no impact, 2 = slight impact, 3 = moderate impact, 4 = strong impact, and 5 = very strong impact (ALwO/caregiver Q510; HCP Q305). Panel A represents the proportion of respondents who indicated that obesity has a strong/very strong impact. Data were recoded to compare each participant's response about the impact of obesity with their response about the impact of other health conditions; if the response was higher for obesity than for another health condition, it was coded as “Obesity is more impactful”; if equal, it was coded as “Obesity is as impactful.” The recoded data are presented in panel B.

obesity was at least as or more impactful than cancer, heart disease, diabetes, depression, and anxiety (at least 65% of ALwO, 61% of caregivers, and 61% of HCPs) (Figure 1). HCP attitudes towards obesity in adolescence are shown in Figure S4.

3.4 | Impact of obesity

Many ALwO agreed that their weight often/always made them unhappy (44%) and their body often/always made them feel insecure (37%), while caregivers less commonly reported that their ALwO had negative attitudes towards themselves (37% and 27%, respectively) (Figure S5).

Most ALwO (76%) felt their weight was above normal, while a lower proportion of caregivers felt their ALwO's weight was above normal (66%). Although only 29% rated their health as fair/poor, 72% were at least somewhat worried about their weight, with 85% worried that it could affect their future health; lower proportions of caregivers responded similarly for their ALwO (20%, 60%, and 80%, respectively) (Figure 2). Additionally, in terms of the current health of ALwO, caregivers less frequently reported diagnosed comorbidities than HCPs (45% and 80%) (Table S1).

3.5 | Weight loss

While 45% of caregivers agreed that their ALwO will naturally slim down as they grow older/taller, only 24% of HCPs agreed (Figure S6). Most ALwO and caregivers agreed that ALwO could lose weight if they set their mind to it (67% and 67%), but a greater proportion of ALwO than caregivers indicated that weight loss was entirely the ALwO's responsibility (65% and 37%) (Figure 3). By comparison, a lower proportion of HCPs (27%) agreed that weight loss was completely the responsibility of their ALwO patients (Figure S6).

Overall, 58% of ALwO reported a recent weight loss attempt and 75% were likely to make a weight loss attempt within 6 months; a lower proportion of caregivers responded similarly for their ALwO (41% and 63%, respectively) (Figure 3). HCPs reported that 38% of their ALwO patients made a serious attempt to lose weight within the past year, of whom 33% were successful.

Although 22% of caregivers reported that their ALwO had no desire to lose weight, only 12% of ALwO felt this way. Perceptions of motivators for ALwO weight loss differed between respondent groups; wanting to be more fit/in better shape was most commonly reported by ALwO (40%) and caregivers (32%), whereas HCPs

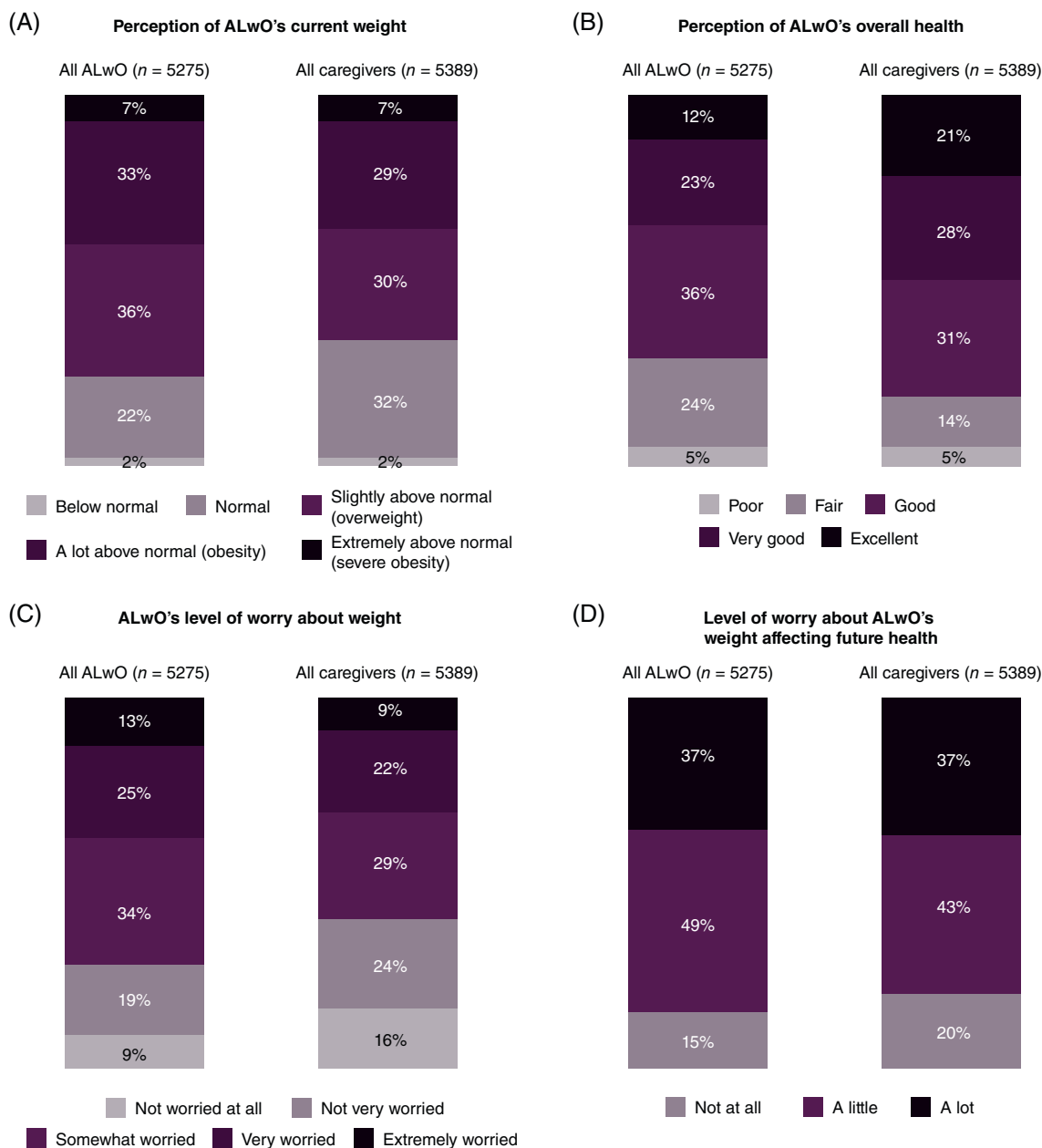


FIGURE 2 ALwO and caregiver perceptions of the impact of obesity on ALwO: (A) perception of ALwO's current weight; (B) perception of ALwO's overall health; (C) ALwO's level of worry about weight; and (D) level of worry about ALwO's weight affecting future health. ALwO, adolescents living with obesity. Percentages are proportions of participants who selected each prespecified response option, among all recruited ALwO (left bars) or caregivers (right bars). ALwO data are based on responses to ALwO Q106, Q101, Q108, and Q512, and caregiver data are based on responses to caregiver Q106, Q101, Q112, and Q515. Percentages may not sum to 100% due to rounding.

believed the greatest motivators were wanting to have improved confidence/self-esteem (69%) and social life/popularity (69%) (Figure 4). According to ALwO and caregivers, the most common barriers to ALwO weight loss were not being able to control hunger (38% and 29%), lack of motivation (34% and 26%), and enjoyment of unhealthy food (32% and 28%) (Figure S7A). A large majority of HCPs agreed that unhealthy eating habits, lack of exercise, and a preference for unhealthy food were barriers (93%, 92%, and 91%, respectively) (Figure S7B).

ALwO and caregivers most commonly defined successful ALwO weight loss as feeling better about themselves (41% and 35%), whereas for HCPs it was an improved diet (61%) (Figure S8).

3.6 | Conversations about weight

Most ALwO could discuss their weight honestly with their mother/father (63%), but only 31% could talk to an HCP about

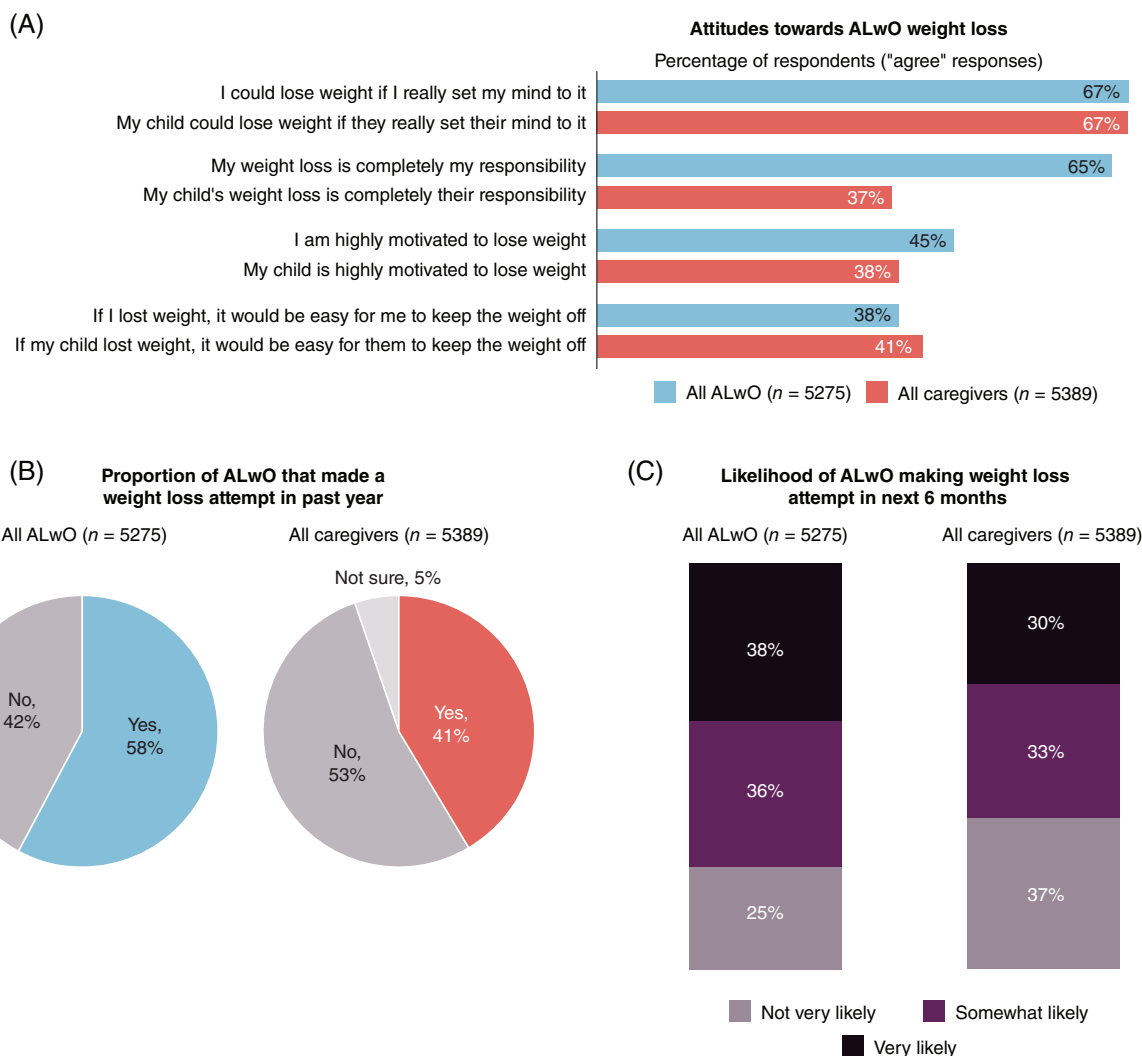


FIGURE 3 ALwO and caregiver weight loss attitudes and ALwO weight loss attempts: (A) attitudes towards ALwO weight loss; (B) proportion of ALwO who made a weight loss attempt in the past year; and (C) likelihood of ALwO making a weight loss attempt in the next 6 months. ALwO, adolescents living with obesity. Percentages are proportions of participants, among all recruited ALwO or caregivers. ALwO data are based on responses to ALwO Q113, Q108a, and Q109, and caregiver data are based on responses to caregiver Q113, Q110a, and Q111. For each question, response options were prespecified and only one option could be selected. Panel A presents the proportion of participants who indicated that they “strongly agree” or “somewhat agree” with each statement. For panel C, the “not very likely” category includes the response options “not likely at all” and “not very likely,” and the “very likely” category includes the response options “very likely” and “extremely likely.” Percentages may not sum to 100% due to rounding.

their weight honestly. Barriers to discussing ALwO weight with HCPs are shown in Figure S9.

Approximately 60% of ALwO and caregivers had talked to an HCP (primarily the ALwO's doctor or a dietitian/nutritionist) about their/their child's weight in the past year (Figure S10), and HCPs reported discussing weight with a similar proportion of their ALwO patients (61%). ALwO and caregivers most commonly reported that caregivers initiated weight discussions during HCP appointments (37% and 41%), whereas HCPs felt they typically initiated discussions (54%) (Figure S11A). However, most ALwO felt they should initiate weight discussions (55%) (Figure S11B). HCPs typically indicated that the responsibility for initiating discussions varies depending on the

patient (49%), but otherwise felt HCPs should be responsible (27%) (Figure S11B).

Most HCPs were very/somewhat comfortable discussing weight with ALwO patients (82%) and their caregivers (83%). The criteria they most commonly consider when deciding whether to initiate weight discussions are the presence of obesity-related comorbidities (66%) and BMI-for-age and sex (66%). Many ALwO (64%) and caregivers (53%) had been told by their/their child's doctor that the ALwO has overweight. HCPs reported informing a mean of 78% of their ALwO patients/their caregivers about the ALwO's obesity diagnosis, although a lower proportion of ALwO (44%) and caregivers (29%) reported having been informed. A small proportion of

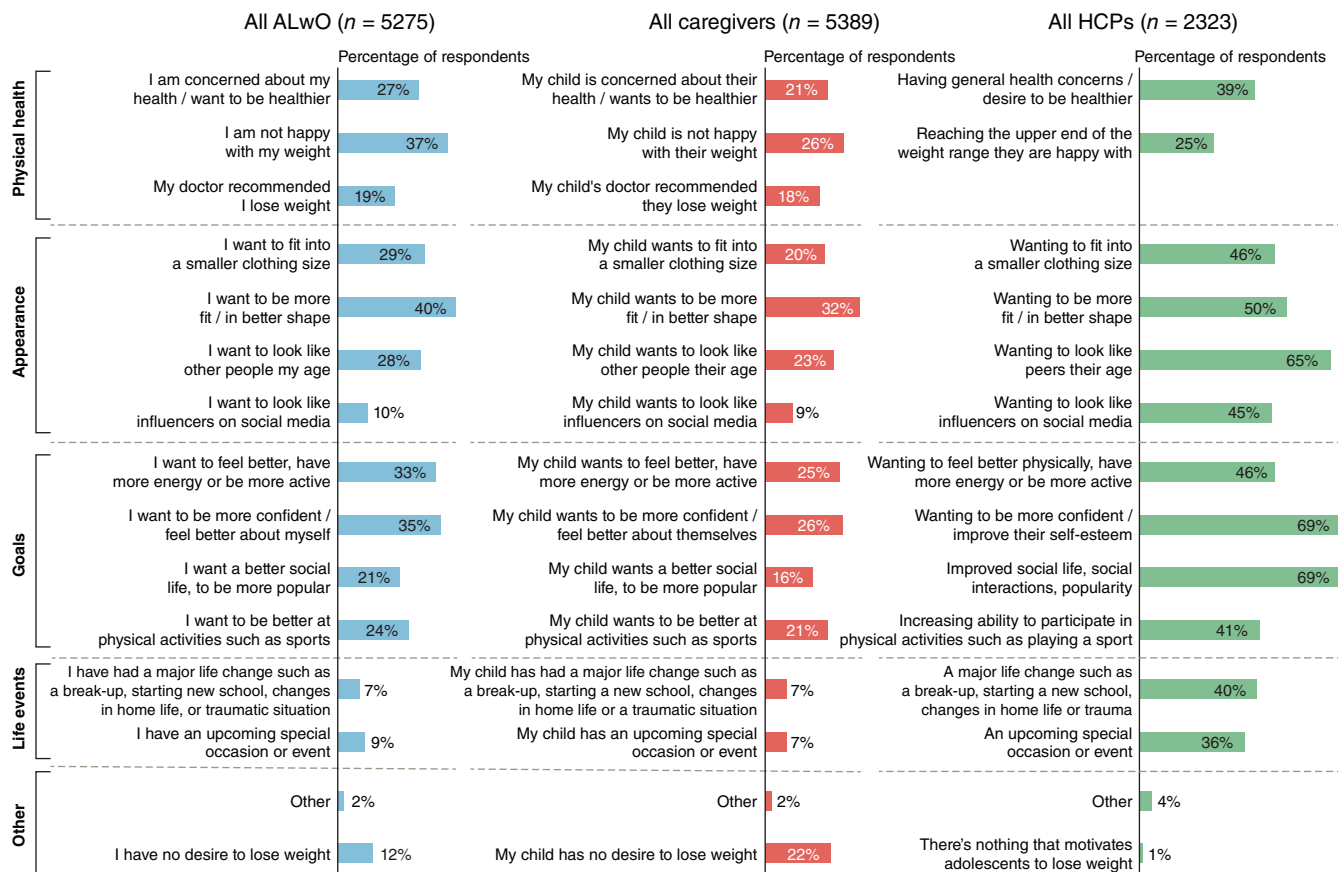


FIGURE 4 ALwO, caregiver, and HCP defined motivators for ALwO weight loss. ALwO, adolescents living with obesity; HCP, healthcare professional. The first two columns present the prespecified response options selected by ALwO and caregivers when asked why they/their child has wanted to lose weight (ALwO/caregiver Q208), among all recruited ALwO and caregivers. The third column presents the prespecified response options selected by HCPs when asked what most motivates adolescents to lose weight (HCP Q205), among all recruited HCPs.

HCPs (4%) never informed the ALwO/their caregivers about the obesity diagnosis. Three-quarters of HCPs indicated an obesity diagnosis was always recorded in their ALwO patients' medical records or recorded most of the time (sometimes recorded: 17%; rarely recorded: 7%).

Among ALwO and caregivers who reported that the HCP usually initiated conversations about their/their child's weight in the past year ($n = 966$ and $n = 1200$), most liked that the HCP had discussed this (76% and 86%). Similarly, among ALwO and caregivers who reported that there had been no weight discussions with HCPs in the past year or the HCP was not usually the initiator of weight discussions ($n = 4309$ and $n = 4189$), most would like the HCP to discuss weight (64% and 65%).

ALwO and caregivers who discussed the ALwO's weight with an HCP in the past year generally had a positive attitude towards HCPs. Most agreed that they feel comfortable talking to the HCP about weight (65% and 72%) and trust the HCP's weight management advice (74% and 77%), and that the HCP understands the difficulties of weight loss (68% and 71%) and listens carefully when the ALwO talks about weight (72% and 74%). After their most recent weight discussions with HCPs, ALwO and caregivers had a mix of positive and negative feelings, most commonly

motivated (38% and 43%), supported (34% and 43%), and hopeful (30% and 34%) (Figure 5).

3.7 | Weight management

Most HCPs agreed that obesity is a chronic disease (82%) and a weight loss of 5%–10% would be extremely beneficial to an ALwO's overall health (92%) (Figure S12). HCPs who discussed weight management with ALwO most frequently recommended improving eating habits (62%), becoming more physically active (58%), and reducing screen time (47%); HCPs also believed these were the most effective weight management methods (83%, 80%, and 65%, respectively) (Figure S13). Improving eating habits and becoming more physically active were also the two weight management methods that ALwO used most frequently in the past year, according to ALwO (41% and 34%, respectively) and caregivers (40% and 36%, respectively) (Figure S13). Among the ALwO surveyed, 17% had gone on a specific diet or diet program and 14% had started a formal exercise program, while 8% had taken over-the-counter weight loss medication, 6% had taken prescription weight loss medication, and 2% had undergone weight loss surgery (Figure S13).

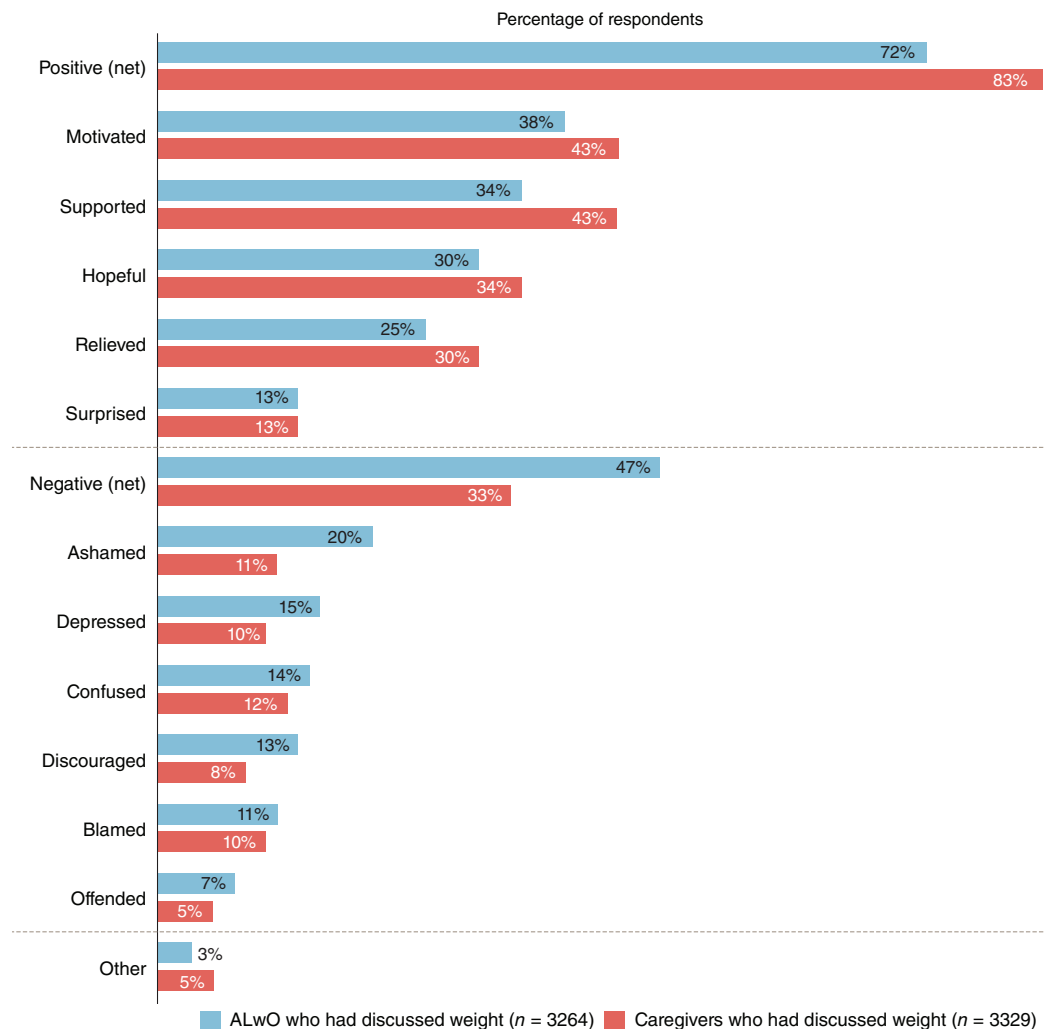


FIGURE 5 ALwO and caregiver feelings after their most recent weight discussion with an HCP. ALwO, adolescents living with obesity; HCP, healthcare professional. Percentages are proportions of participants who selected each of the prespecified response options in ALwO/caregiver Q410, among the subset of ALwO who had discussed weight with their HCP in the past year or the subset of caregivers who had discussed their child's weight with an HCP in the past year (per ALwO/caregiver Q201). Caregivers responses reflect their own feelings, not their perception of their child's feelings. The net positive category is the proportion of participants who selected at least one positive answer (i.e., motivated, supported, hopeful, relieved, and/or surprised); the net negative category is the proportion of participants who selected at least one negative answer (i.e., ashamed, depressed, confused, discouraged, blamed, and/or offended).

4 | DISCUSSION

The ACTION Teens study provides important insights into the needs of ALwO and has identified several key areas of misalignment between ALwO, caregivers of ALwO, and HCPs involved in obesity management/treatment. The results suggest caregiver underestimation of the impact of obesity on ALwO and the desire of their ALwO to lose weight, and HCP misperception of key motivators and barriers for weight loss among ALwO.

Although most ALwO and caregivers recognized the impact of obesity on a person's overall health and wellbeing, and were aware that the ALwO's weight was above normal, a greater proportion of caregivers than ALwO believed the ALwO's weight was normal. This is not surprising, given that fewer caregivers than ALwO had been informed about the obesity diagnosis by a doctor. It may also relate to

the belief that ALwO will naturally slim down as they grow older/taller, a statement with which nearly half of all caregivers agreed versus only a quarter of HCPs. Similarly, other studies have reported that parents/caregivers of children with overweight/obesity tend to underestimate their child's weight status,^{12,13,16,17} more so than the children themselves,¹² and that some caregivers believe their child will have a normal weight when they grow older/taller.¹⁷ Taken together, these findings may explain why fewer caregivers in this study were worried about the impact of weight on their ALwO's future health than ALwO themselves. Furthermore, they suggest a need for improved caregiver education on the natural course of obesity and its health impacts.

We also found that greater proportions of ALwO were highly motivated to lose weight, had made recent weight loss attempts, and were likely to attempt weight loss in the near future than the

proportions of caregivers who responded similarly to their child. This is consistent with the results of a smaller US-based survey study of adolescents with severe obesity, which found adolescents and their mothers had conflicting perceptions of weight management behaviours.¹¹ In ACTION Teens, 65% of ALwO believed weight loss was completely their responsibility, while 37% of caregivers thought it was completely their child's responsibility. These differences in perception may impair the level of support that ALwO receive from caregivers during weight loss attempts.

While ALwO and caregivers' perceptions of weight loss motivators and barriers for ALwO were aligned, caregivers reported these less frequently than ALwO. The disparity was even greater with HCPs. While being more fit/in shape was the leading motivator for ALwO, HCPs rated improved confidence/self-esteem and social life as the key motivators. Similarly, while the inability to control hunger was the leading barrier for ALwO, it was only the sixth most important barrier for HCPs. This suggests that guidance provided by HCPs for ALwO weight loss may not target the correct motivations/barriers, potentially decreasing the chance of successful weight management strategies. However, most HCPs agreed that weight loss barriers included adolescents not perceiving overweight as a disease, not receiving support from friends and family, and not being able to afford (or having limited access to) healthy food. This aligns with findings from another international survey study, in which HCPs similarly ranked obesity not being recognized as a disease, belief in individual responsibility, and food costs/obesogenic food environments as some of the key barriers to successful obesity treatment.¹⁸

Overall, the misalignment observed between ALwO, caregivers, and HCPs suggests there may be a communication barrier. Notably, a substantial proportion of ALwO felt they could not discuss their weight honestly with their parents (37%) or HCP (69%), and only 62% of ALwO reported having discussed their weight with an HCP in the past year. Additionally, nearly half of all ALwO reported feeling at least one negative feeling (most commonly ashamed) after their most recent weight discussion with their HCP. Negative feelings may discourage ALwO from discussing weight with their HCP in the future, so it is important for HCPs to approach weight loss conversations in a non-judgmental, caring, and supportive manner.¹⁹ Encouragingly, like the adults with obesity who were surveyed for the ACTION IO study,¹⁴ ALwO most frequently felt motivated, supported, and hopeful after they last discussed weight management with their HCP. Despite this, ALwO primarily obtained weight management information from online channels, and when asked about their single most important information source, similar proportions of ALwO selected YouTube (15%) and social media (13%) as selected doctors (14%). As such, YouTube and social media may be important means of communicating with ALwO, although the development of useful online health resources for adolescents requires consideration of their needs regarding online health information searches and insights from adolescents themselves.²⁰

Although only HCPs who spend $\geq 50\%$ of their time in direct patient care and treat ≥ 10 ALwO in a typical month were eligible for this study, only 13% of the HCPs surveyed had completed more than

1 day of advanced training in obesity/weight management with certification/evaluation. This suggests a potential need for additional training support for HCPs who treat ALwO. In a previous qualitative questionnaire-based study in Spain, pediatric staff treating obesity indicated that there was a particular need for training on motivational skills, as opposed to clinical knowledge.²¹

While most HCPs recognized that obesity is a chronic disease, this did not always align with their other beliefs. For example, HCPs placed greater emphasis on lifestyle factors as barriers to ALwO weight loss compared with biological factors like genetics. A US study found most practicing pediatricians (88% of those surveyed in 2017) agreed they can help prevent childhood obesity,²² suggesting that HCPs acknowledge the importance of their role in childhood weight management. This attitude was mirrored in ACTION Teens, wherein 87% of HCPs agreed they have a responsibility to contribute actively to their ALwO patients' weight loss efforts. Despite this, 27% of HCPs indicated that weight loss was entirely the ALwO's responsibility, therefore at least 14% of HCPs agreed with both statements, despite the apparent conflict between the two beliefs. However, relatively speaking, a far greater proportion of ALwO believed that weight loss was entirely their responsibility (ALwO: 65%; HCPs: 27%). This finding suggests that ALwO themselves may not view obesity as a chronic disease and may be unaware of the biological basis for obesity; therefore, there appears to be a need to reframe this concept in communications targeted towards ALwO. However, it should be noted that the ALwO surveyed were not explicitly asked whether they view obesity as a chronic disease.

Despite the apparent conflict between HCPs' beliefs about their responsibility versus the responsibility of ALwO in terms of weight loss efforts, HCPs appeared to be taking steps to address obesity in ALwO by frequently recording the diagnosis in medical records (75% recorded this always or most of the time) and raising the topic with ALwO (discussed with 61% of ALwO patients). This was surprising, given that an Australian study of randomly sampled general practitioners found that overweight/obesity was only managed once per 58 encounters with children/adolescents with overweight/obesity.²³ This difference may relate to the requirement for HCPs in ACTION Teens to typically treat ≥ 10 ALwO per month, which could have selected a population of HCPs with a greater focus on adolescent obesity than the Australian general practitioners; notably, only 57% of HCPs in ACTION Teens were primary care practitioners. Alternatively, there may have been an element of recall bias during survey completion.

Strengths of the study include that this is the first systematic quantitative examination of the lived experience of ALwO. The study is also unique in surveying three groups—ALwO, caregivers of ALwO, and HCPs involved in obesity management/treatment—which provides important insights into areas of misalignment between key stakeholders. Additionally, this is the largest study of its kind, with nearly 13 000 participants surveyed across 10 countries. Finally, there was stratified sampling and demographic weighting of caregivers to mitigate selection bias and for generalizability, and locally appropriate, age-specific definitions of obesity were used. Overall, the recruitment

of a large sample from a diverse group of countries should allow for generalizability of findings.

Study limitations include its cross-sectional design and the use of self-reported weight and height, which may have underestimated BMI, and does not provide data on body composition. Adolescents with a BMI below the threshold for obesity, but with increased body fat were therefore not included. The HCP response rate was also fairly low, which may affect sample representativeness; however, low response rates are typical for survey-based studies, including ACTION IO.¹⁴ We assume that similarly low response rates would have been observed for ALwO and caregivers; however, it was not possible to calculate this due to the recruitment of ALwO via their caregivers, which meant both parties accessed the survey via a single link sent to caregivers. Additionally, while attempts were made to maximize the recruitment of matched pairs, most ALwO (82%) and caregivers (83%) were not matched, and HCPs were not matched with ALwO/caregivers, limiting the ability to directly compare responses between groups. Assessment of the pubertal stage would have been desirable to evaluate its impact on survey outcomes; however, it was not possible to assess this without including potentially culturally inappropriate questions, therefore a proxy of age subgroups was considered appropriate. Finally, given the timing of the study, it would have been interesting to explore the effect of the COVID-19 pandemic on survey responses, although this was not possible due to the study design.

Future research is needed to determine if interventions targeting the identified misperceptions and areas of misalignment between ALwO, caregivers, and HCPs can have a positive effect on their behaviours, and thus improve obesity management.

In conclusion, results from the global, cross-sectional, survey-based ACTION Teens study suggest that ALwO are concerned about obesity, have a desire to lose weight, and believe it is their responsibility to do so. However, several key areas of misalignment were identified between ALwO, caregivers of ALwO, and HCPs involved in obesity management/treatment, including caregiver underestimation of the impact of obesity on ALwO and the desire of their ALwO to lose weight, and HCP misperception of the key motivators and barriers for weight loss among ALwO. These findings suggest a need to improve communication between ALwO, their caregivers, and treating HCPs, and a need for educational support for caregivers and HCPs on the experiences, challenges, and needs of ALwO.

AUTHOR CONTRIBUTIONS

All authors contributed to the design of the study. All authors participated in interpretation of the data and in drafting and revising the manuscript. All authors reviewed and approved the final, submitted version.

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CONFLICT OF INTEREST

With the exception of Cynthia Karenina Osorto and Ricardo Reynoso, all authors received consultancy fees from Novo Nordisk for their role as members of the ACTION Teens Steering Committee during the conduct of the study. The authors also disclose the following conflicts of interest: Jason C.G. Halford reports consultancy fees from Boehringer Ingelheim and Dupont (paid to the University of Leeds), honoraria from Novo Nordisk (paid to the University of Leeds), support for attending meetings from Novo Nordisk, and financial support for participation in an advisory board for Dupont (paid to the University of Leeds), all outside the submitted work. Abdullah Bereket reports honoraria from Novo Nordisk outside the submitted work. Bassam Bin-Abbas discloses no additional conflicts of interest. Walter Chen discloses no additional conflicts of interest. Fernando Fernández-Aranda reports grants from Novo Nordisk, lecture fees from the organizers of the ICOMES conference, support for attending meetings and travel from Novo Nordisk, Editor-in-Chief honorarium from Wiley, and participation in a Data Safety Monitoring Board for Sustain Project—Germany, all outside the submitted work; he is also Past-President of the Eating Disorders Research Society and Co-Chair of the ED Section of the World Psychiatric Association. Nayely Garibay Nieto reports honoraria (for lectures) from Eli Lilly and Merck Serono outside the submitted work. Juan Pedro López Sigüero reports honoraria (for lectures) from Merck, Novo Nordisk, and Sandoz, and participation in advisory boards for Merck and Novo Nordisk, all outside the submitted work. Claudio Maffei reports honoraria (for lectures) from Aboca, Eli Lilly, Novo Nordisk, Sandoz, and Sanofi, and participation in advisory boards for Abbott, Eli Lilly, Roche, and Sanofi outside the submitted work. Vicki Mooney reports consultancy fees from Boehringer Ingelheim, speaker fees from Ethicon and Novo Nordisk, and grants (paid to the European Coalition for People Living with Obesity) from Medtronic and Novo Nordisk, all outside the submitted work. Cynthia Karenina Osorto is an employee of Novo Nordisk and owns shares in Novo Nordisk. Ricardo Reynoso is an employee of Novo Nordisk and owns shares in Novo Nordisk. Young-Jun Rhie discloses no additional conflicts of interest. Martín Toro-Ramos reports speaker fees from Novo Nordisk and Sandoz, support for attending conferences from Novo Nordisk, and participation in an advisory board for Novo Nordisk outside the submitted work. Louise A. Baur reports speaker fees from Novo Nordisk outside the submitted work.

DATA AVAILABILITY STATEMENT

Data will be shared with bona fide researchers submitting a research proposal approved by the independent review board. Individual participant data will be shared in data sets in a de-identified and anonymized format. Data will be made available after research completion. Information about data access request proposals can be found at novonordisk-trials.com.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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