

Running Title: CHILDREN'S CONCEPTS OF BODY SIZE INCREASES

A qualitative, prospective study of children's understanding of weight gain

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Abstract

This study examined 3- to 5-year-old children's understandings of increases in body size via a qualitative prospective approach. A sample of 259 children (55.2% girls) was interviewed at 3, 4 and 5 years old. Participants were shown an average and a larger size figure of a child of their gender and age. Responses to "Why do you think the boy/girl got bigger here?" were coded using thematic analysis. Diet was cited as a mechanism for increased body size by almost 50% of children referring to this by age 5. Few children mentioned physical activity. Responses suggesting that increases in body size had negative implications increased between ages 3 and 5. Awareness of associations between diet and weight gain emerge as young as 3 years old and increase over time, as do negative attitudes about weight gain. This age may be opportune for interventions targeting sustainable healthy behaviors.

Keywords: Young children, Qualitative, Weight gain, Weight stigma

Introduction

With the steep rise of weight at the population level throughout the Western world during recent decades, most attention has been directed towards understanding the individual level behaviors that contribute to weight gain. Other contributing factors, such as environmental influences or social attitudes, have in contrast received far less attention (Puhl, & Heuer, 2010). Specifically, behaviors such as eating, physical activity, and sleep have been put forward, and to some extent supported, as important contributors (Leech, McNaughton, & Timperio, 2015). These factors are much emphasized in public health messages as playing an important causal role in weight gain (Blaine & McElroy, 2002). To date though, it is unclear to what extent these messages are understood and endorsed by young children, and little is

known regarding the development of conceptualization around weight gain in pre-school children. Weight bias, however, that is negative attitudes and resulting discriminatory behaviors towards individuals on the basis of their weight, has been shown to develop in children as young as 3 years old (Spiel, Paxton, & Yager, 2012). While attitudes towards weight gain specifically have rarely been investigated, it is likely that even children aged 3-5 years may hold negative attitudes towards its consequences. The present study therefore aimed to explore young 3- to 5-year-old children's attitudes and understandings of the mechanisms of body size increases using a prospective approach.

The rising rate of higher weights among children, which is associated with various health and psychosocial negative outcomes, has been accompanied by a focus on prevention through lifestyle changes, in particular, diet and physical exercise (Wang et al., 2013). To date, however, little is known regarding the way in which children aged 3-5 years conceptualize weight gain in children, and the role of lifestyle factors. A still scant body of research has started to examine these conceptualizations among slightly older children. For example, children aged 9-10 years have been shown to distinguish between children for whom larger bodies might be genetically predetermined, and therefore not susceptible to modification, and other children whose body size is interpreted as being due to factors such as diet (Dixey, Sahota, Atwal, & Turner, 2001). Sustaining a varied and balanced diet as well as engaging in physical activity from an early age has benefits for health, above and beyond their potential for weight control, and therefore promoting the development of such behaviors is an important focus (Evans, Christian, Cleghorn, Greenwood, & Cade, 2012; Janssen & LeBlanc, 2010). It is probable that children who have an understanding of the importance of healthy behaviors for preventing a variety of negative outcomes will be more likely to engage in them. Furthermore, misconceptions regarding the limits within which diet and physical activity are associated with weight and shape, and which types of behaviors may be considered to be health promoting versus excessive may help prevent the emergence of risky behaviors aimed at weight control (Anesbury & Tiggemann, 2000). Therefore, investigating the understanding of these mechanisms in children aged 3-5 years is a critical aspect of promoting healthy lifestyles.

While young children's understanding of weight gain is poorly understood, an emerging body of literature has documented the presence of weight bias in children as young as 2 years old (Spiel et al., 2012; Turnbull, Heaslip, & McLeod, 2000). In a sample of 2- to 5-year olds, more negative characteristics (more ugly, less pretty, left out of games, could not

run fast, more stupid) were attributed to a larger doll compared to a thinner one (Turnbull et al., 2000). Furthermore, these stereotypes were particularly strong towards the female doll, and among 5 year old children (Turnbull et al., 2000). Similarly, in young children aged 4 years old, larger figures were selected by children to represent negative characteristics (mean, naughty, rude) (Damiano, Gregg, et al., 2015). The presence of such stereotypes have also been robustly shown among older children (Penny & Haddock, 2007). Given this documented weight bias, it is likely that children aged 3-5 years might also attribute negative implications to weight gain, however, this has yet to be explored.

To our knowledge, only one study has investigated the development of conceptualization of weight in young children aged 5 years old (Baxter, Collins, & Hill, 2015), and none have investigated the emergence of this understanding over time. This is an important gap as the extant research suggests that by this age some children have already developed forms of weight bias (Damiano, Gregg, et al., 2015), although recent research suggests that children's attitudes about others may in part be determined by perceived similarity to themselves as well as attitudes specific to weight. Furthermore these children may have some degree of autonomy regarding their lifestyle, including food choices and physical activity (Charsley, Collins, & Hill, 2018). In addition, increasing our understanding of how these conceptualizations around weight gain and its implications develop between the ages of 3 and 5 is an important question as it will help to inform prevention interventions to increase healthy behaviors and decrease weight bias among children aged 3-5 years. In their study among 5 year olds, Baxter et al. (2015) described that the majority (96%) of their sample of 36 children cited food as a factor for weight gain spontaneously, while fewer mentioned physical activity factors, suggesting that the idea that food intake is related to weight gain is one already familiar to most 5 year olds. These findings are consistent with those among older children aged 4-11 years, who have been described as viewing body weight as being highly controllable by the individual (Rees, Oliver, Woodman, & Thomas, 2011).

Building on these findings, the aims of the present study were, therefore, to investigate the prospective development of the meaning children make of increases in body size, by examining the most salient explanations that 3- to 5-year-old children propose to understand body size changes. A particular interest was the extent to which young children relate these changes to particular patterns of eating behaviors and physical activity, as well as the extent to which an increase in body size had negative implications. Specifically, we

hypothesized that as children grow older, the proportion of children identifying eating patterns and physical activity as causal factors for weight gain, and increases in body size as having negative implications, will increase.

A further aim was to examine possible gender differences at these young ages. As described above, even among children aged 3-5 years gender differences have been reported in the stereotypes associated with overweight (Turnbull et al., 2000), consistent with those described among adults (Fikkan & Rothblum, 2012). However, other studies among children aged 3-5 years have not found gender differences in the development of weight bias (Spiel et al., 2015). Therefore, it was expected that in our study, no gender differences would be found in the salient associations and explanations 3- to 5-year-olds offered for body size changes.

Methods

Participants

The sample comprised 259 children (55.2% girls; Mage = 3.48 years, SD = 0.33, range 3-4 years) from Melbourne, Australia. Families were recruited into the Children's Body Image Development Study when children were 3 years old through advertisements in childcare centers and playgroups. Initially 295 children and a parent completed assessments at age 3 (Time 1) and then yearly at ages four (Time 2) and five (Time 3). Children with complete data at all time points (88%) were included in this study. Postcode data indicated 58% of families in the initial sample lived in high socioeconomic areas, 32% in average areas, and 10% in disadvantaged areas (Australian Bureau of Statistics, 2011). Parents were mostly well-educated, holding university degrees (77.1% mothers; 65.4% fathers). At Time 1, the mean BMIz was .46 (SD = 1.1), with 25% of the sample above the age and gender adjusted 85th percentile.

Measures

The primary caregiver (98% mothers) provided demographic data in a self-report questionnaire including child age and gender, residential postcode, and parent's level of education. Postcodes were used to characterize the level of affluence of the neighbourhood in which families resided as described above. Parents indicated whether they had completed year 10 or less, year 11, secondary school, held a certificate, a university degree, or a higher university degree. Anthropometric measures were collected for children by the interviewer.

BMI was calculated and converted into a standardized BMI z-score adjusting for age and gender (BMIz).

Meaning of body weight and shape increases. Children's conceptualisations of body weight and shape increases were assessed using a method adapted from Lowes and Tiggemann (2003) (see Damiano, Gregg, et al., 2015; Damiano, Paxton, Wertheim, McLean, & Gregg, 2015). As part of a play-based interview to aid child engagement, children were presented with two cut-out child-figure silhouettes 20cm in height matching the child's gender. These were adapted from the middle and largest of the line figure drawings used by Tiggemann and Pennington (1990). The first figure was average body size, the second substantially larger bodied. The interviewer told a story of a child the participant's age "...who used to look like this [average figure indicated], and now he/she looks like this [larger figure indicated]. So, he/she is the same height [demonstrates], but he/she has changed." After confirming children understood the change involved a larger body, children were asked, pointing to the abdomen, "Why do you think the boy/girl got bigger here?" A prompt ("just take your best guess", "any ideas?") was offered if the child did not respond. If a child was still unsure or had no ideas, the interviewer moved on in the interview and their response was recorded as "unsure/no response".

Procedures

Following University Human Ethics Committee approval, families with 3-year-olds were recruited. Parents provided written consent for their own and their child's involvement, and children provided verbal assent.

Trained interviewers with experience testing children conducted play-based interviews in the child's home. Interviews lasted approximately 30 minutes. The questions that are the focus of the present study were preceded by questions that covered a range of topics including the child's attitudes towards their own body and preferred body size, appearance conversations of their friends, and a play assessment of weight bias using story characters. These were presented in a playful way, using felt characters and colorful materials, and interspersed with questions about the child's favorite color, toy and geometric shape. No questions that specifically asked about causes of weight change, or the role of food and exercise were asked prior to the questions analyzed here. Parents completed a questionnaire covering demographics. Other child and parent measures are reported elsewhere (Damiano, Gregg, et

al., 2015). On completing each interview, children received a sticker and families an AU\$10 shopping voucher and prize entry for vouchers.

At Times 2 and 3, parents were recontacted. Strategies to reduce participant attrition between time points included personal contact when organizing interviews and communication through newsletters and greeting cards.

Data Analyses

Children's interview responses were transcribed and entered into a spreadsheet in which data from different time points and genders were intermingled so age and gender were unidentifiable. A thematic analysis was then conducted (Braun & Clarke, 2006) with three authors independently identifying themes. Discrepancies between raters were discussed and theme coding categories decided by consensus.

Two authors then reviewed the spreadsheet, coding each response according to whether it represented each thematic category. Responses could be coded into multiple themes. A senior author reviewed discrepant codings to make a determination. For each thematic category, responses reflecting the theme were scored 1, with 0 allocated when themes were not present. While children provided one response each, sometimes the children included multiple concepts in their response. These responses were then coded as containing more than one theme.

For quantitative analyses, overarching themes for primary analyses were identified, including two a priori themes (food and eating-related and physical activity exercise-related responses) and major themes were identified inductively in thematic analysis (e.g., concrete descriptions of growing, negative implications). Inter-rater reliability was assessed through percentage agreement, and kappa coefficients that were interpreted using the guideline outlined by Landis and Koch (1977), with kappa = 0.21-0.40 fair; 0.41-0.60 moderate; kappa = 0.61-0.80 substantial; and kappa = 0.81-1.00 almost perfect. Inter-rater reliability was high with rates of 99.4% agreement for the food and eating-related category, kappa = .98, 97.5% agreement for the growing category, kappa = .92, and 98.8% agreement for negative implications, kappa = .93.

Chronological differences across the three time points were examined using Cochran's Q tests comparing proportions of children mentioning each theme at each time point. When Cochran's Q was significant, McNemar tests compared pairs of time points.

Gender differences were examined using chi-square tests. Because of the multiple analyses conducted, an alpha level of .01 was used to determine significance.

Results

Themes Identified

Table 1 displays themes identified and sample quotes from children's responses. Overall, 44.8% of children offered relevant responses when considering the three time points together, while the remainder (depending on age) were unsure, did not know, or did not provide a coherent answer. As a note, these types of responses were included in the subsequent analyses, and rates of unsure/unclear/no response answers were compared across time points.

Food eaten. The predominant theme (267 responses across the three years; 34.4%) involved suggestions that the quantity or type (quality) of food eaten was the reason why the child's figure had increased in size. Responses referred to eating "a lot", eating "too much", and eating particular types of foods, such as sweets, cake, chips, and "junk" food, or eating either too little or too much vegetables or fruit.

Concrete descriptions of increased size or becoming "fat". A strong theme (133 responses; 17.0%) involved children responding with concrete descriptions of body size growing. Some children also mentioned a mechanism of change, which was multiply coded. Children said the figure "grew", "grew bigger", or that specific body parts, typically the "tummy", had become larger. The descriptor of being "fat" or "fatter" was used in 13 (1.7%) of these responses. Only 4 responses, all from children aged 3, incorrectly indicated the figure became taller.

Aging. One mechanism proposed for the size increase was aging (48 responses over the three years; 6.2%). The concept varied in time frame offered from "she's a week older" or "had a birthday" to "now he's a daddy".

Lack of physical activity. Lack of exercise or low physical activity was a weak theme, with only 10 related responses (1.3%).

Minor themes involving change mechanisms. Several further mechanisms were suggested. These weak themes include pregnancy (19 responses, 2.4%) as well as magical interventions, sleeping and playing games (each < 1.0%).

Implications of Body Size Change. Most children's answers were neutral descriptions of body size ("got bigger/fatter") or explanations of change ("ate lots of food", "sometimes you change") in that there was no emotional valence apparent. However, 175 (22.5%) of responses had negative implications. A few of these indicated overt stereotyping ("wanting to be a bit naughty", "greedy", "her legs touched, she ran away"); however, most negative implications were implied, such as, "ate too much food", "grew too big" or "eating rubbish". Positive implications of the change were rare (18 responses; 3.6%); examples included "healthier", "very strong" and "wanted to be big".

Chronological Differences

Table 2 displays percentages of children's responses coded as applicable to each theme at each time point and significance tests examining changes across time points.

Cochrane Q tests for eating-related mechanisms, quantity of food eaten, and quality of food eaten showed significant differences across time points ($p < .001$). For the quantity and quality of food themes, the percentage of children indicating an eating-related mechanism increased with age. McNemar tests comparing each pair of time points indicated that between ages 3 and 4, and between 3 and 5 responses indicating quantity of food significantly increased ($p < .001$), with a trend between ages 4 and 5 ($p = .024$). For responses describing the quality of foods eaten, significant increases were found between ages 3 and 5, and ages 4 and 5 ($p < .001$), with a trend between ages 3 and 4 ($p < .05$). In contrast, the percentage of children providing responses describing likes food/hunger was low and not significantly different across time points.

Regarding responses indicating *increased size or becoming "fat"*, no significant age differences were found for any category, or for the overall theme. The theme lack of physical activity, while not a main theme, did show a significant increase across time points ($p = .003$), with significant differences between ages 3 and 5 ($p = .008$), and between ages 4 and 5 ($p = .07$). The percentage of responses mentioning age also increased at a trend level over time ($p = .022$). Follow-up tests indicated a trend level increase between ages 3 and 5 years ($p = .012$), and between ages 3 and 4 years ($p = .09$).

Our findings revealed no differences across time points in the percentage of responses indicating a positive implication of increasing body size. In contrast, a significant difference across time points was found in the percentage of responses indicating a negative implication ($p < .001$). Significant increases in indicating a negative implication were found between ages

3 and 5, and ages 4 and 5 ($p < .001$), with a trend between ages 3 and 4 ($p = .07$). In addition, as would be expected, the percentage of children providing unclear responses and no responses significantly decreased across time points ($p < .001$).

Gender Differences

A series of 2 x 2 chi-square analyses indicated no significant gender differences at age 3 for the main themes including: eating related responses, growing/getting larger, negative implications, and age. Similarly, a series of chi-square tests conducted on these variables at ages 4 and 5 revealed no significant gender differences.

Discussion

The aim of the present study was to investigate the development of conceptualizations of the mechanisms and implications of weight gain in girls and boys aged 3-5 years by prospectively examining the development of these understandings between the ages of 3 and 5 years old. Our results suggest that during this period, children progressively come to conceptualize weight gain as associated with eating patterns, both in terms of the quantity but also the types of food consumed, with half of responses attributing an eating-related cause to weight gain by age 5. In addition, a clear chronological effect emerged in terms of the implications and valence of weight gain with over a third of responses indicating a negative implication of weight gain by age 5. These findings suggest that these early years may be a critical time for the formation of understandings of the mechanisms involved in individual differences, and change, in body size, and most importantly in developing weight bias.

A third of children indicated that eating-related mechanisms accounted for the change in size and weight gain. Suggestions included the quantity of food eaten ("lots of food", "more food"), but also the types of food consumed. The types of food mentioned were generally those that are promoted as unhealthy ("lots of junk food/sweets"), but sometimes also included foods typically understood to be unlikely to result in weight gain, such as, "lots of vegies and fruit." In addition, a small proportion of responses suggested that individual differences in orientation towards food, or difference in appetite, might be involved. These findings are somewhat consistent with those of other authors who have noted that dieting awareness emerges in children as young as 5 and increases by age 7 years (Dohnt & Tiggemann, 2004).

By age 5, half of the responses indicated a conceptualization that food and eating-related behaviors were involved in change in size and weight gain, an increase from 18% at age 3. This finding suggests that the years between age 3 and age 5 may be a critical time for developing an understanding of the role that food and eating may play in body size, but perhaps also in health generally. Developing and maintaining a healthy lifestyle is important for health and wellbeing throughout the lifespan and developing an understanding of what constitutes health promoting dietary intake from an early age may be protective. On the other hand, it is also known that weight is to a large extent genetically predetermined, and therefore resistant to change through such behavioural strategies (Shaw, Gennat, O'Rourke, & Del Mar, 2006; Thorogood et al., 2011). Furthermore, it has been suggested that belief in the controllability of weight and shape and the contribution of factors such as diet to overweight may be associated with poorer mental and physical health outcomes among individuals with overweight, and greater weight bias towards others (Anesbury & Tiggemann, 2000; Laliberte, Newton, McCabe, & Mills, 2007). As our findings suggest that these conceptualizations develop between the ages of 3 and 5 years old, identifying the messages that children aged 3-5 years are internalizing would be helpful, as would be providing messages that emphasize the importance of health over weight as an outcome of adopting healthy eating patterns.

It is interesting to note, however, and consistent with previous findings (Baxter et al., 2015), that only a very small proportion of children identified lack of physical activity as a mechanism related to increase in weight and body size, with only a small increase such that by the age of 5 years old only 3% of responses mentioned physical activity. This may reflect the fact that the underlying biological mechanisms that connect physical activity to body size are more abstract and less understandable to children aged 3-5 years. However, it might also suggest that the messages that children are exposed to in their sociocultural environment (media, adults, etc.) may place greater emphasis on food as opposed to physical activity as an important behavioral factor related to health (Rodgers, Wertheim, Damiano, Gregg, & Paxton, 2015). Given the numerous documented benefits of regular physical activity for physical and mental health, particularly in children (Donnelly et al., 2016; Janssen & LeBlanc, 2010), it would be important to understand whether children are in fact being taught about the importance of physical activity. Specifically, it would be useful to tease out whether the low rates of these responses are due to a) a lack of helpful information related to physical activity combined with the abundance of information regarding dieting and food, or b)

developmentally-related information processing that renders messages related to food more easily understood and conveyed by children of this age.

A significant proportion of children provided responses indicating negative implications of increases in body size and weight indicative of weight bias, with up to 36% of responses suggesting this by age 5. In addition to responses indicating the larger body size was due to “too much junk/ lunch/food”, etc., such responses included being “sad,” “naughty,” and “unhealthy.” These findings are consistent with those of other studies indicating that weight bias appears very early among young children (Damiano, Gregg, et al., 2015; Spiel et al., 2012). The current study was not designed to specifically assess bias, thus the proportions here should be interpreted with caution; however, the discrepancy with the very small number of responses indicating the presence of any positive implications related to increased body size and weight is striking. Furthermore, as there were no specific prompts to access attitudes to body size, these are likely underestimates of the proportion of children who associate body size with negative (or positive) personal attributes. It is also possible, however, that children's responses were influenced by the specific questioning relating to the figures' shape and size, and that this might have increased responses that cast weight gain in a negative light. However, some degree of specificity is necessary when interviewing children this young.

In addition, and consistent with children's observations of their growth and development, a number of responses indicated that an increase in body size and weight was due to growing and aging, with the rates of such responses remaining somewhat consistent between 3, 4 and 5 years old. Finally, a small proportion of children provided responses indicating that the change was due to magic, or other imaginative mechanisms, and a small percentage of responses described pregnancy as a reason for the body size and weight change. These findings highlight that conceptualizations of body change are still evolving in some young children.

As expected, and consistent with previous findings in 5-year-olds (Lowes & Tiggemann, 2003; Rodgers et al., 2015), gender differences in the proportion of children suggesting eating-related or age and growth-related mechanisms were not found, nor did gender differences emerge in terms of negative implications. Therefore, the gendered aspect of attitudes related to weight bias and weight control strategies that is present among adults does not seem to have yet developed among children of this age (Fikkan & Rothblum, 2012).

It would be important to explore gender differences in understandings of body size and weight as children continue to age.

This study presents some limitations. The aim of this study was to examine the most salient responses children had to body size changes, not all their responses. It is likely that a higher proportion of children did consider food as a source of the body size change; however, that was not the most salient meaning for them so it was not verbalised in response to the figures presented. A similar point should be made regarding the negative implications. Future research should aim to investigate these more systematically. However, the current approach may have the advantage of minimising suggestibility effects that can occur in young children (Gee, Gregory, & Pipe, 1999; Waterman, Blades, & Spencer, 2001). In addition, it is possible that the repetition of the interview protocol might have influenced children's responses over time, however, a yearly interval is also a long period of time at this age.

Conclusion

The current study is the first to investigate the understandings of body size change and weight gain among children aged 3-5 years, and the changes in these conceptualizations between the ages of 3 and 5 years old. Our findings highlight the salience of food-related concepts, relative to other factors such as physical activity or genetic and environmental determinants of body size, as well as negative implications of increasing weight, and suggest that these years may be critical for forming attitudes that may lead to the development of sustainable healthy habits in children. As attitudes related to weight and its determinants have been suggested to be difficult to change later in life (Puhl & Heuer, 2009), fostering size acceptance from an early age in children may be a useful strategy.

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Table 1

Themes Related to Children's Conceptualisations of Why the Figure Became Larger, with Sample Quote Excerpts

Themes	Sample quote excerpts
Eating related	
- Ate a large quantity	"he ate a lot of food", "eating more food", "she keeps eating", "ate too much food",
- Quality of food	"ate cake", "ate unhealthy food", "ate junk food", "kind of eating unhealthy food like popcorn, chips and chocolate", "eats strawberries, lots and lots", "didn't eat much veggies and fruits"
- Likes food or hungry	"very hungry", "very greedy, Charlie at the chocolate factory", "was always starving"
Lack of physical activity	"didn't do exercise", "stopped running around", "didn't do anything, just lying there", "watched TV & iPad"
Aging	"getting older", "grew up", "had his birthday", "when you get older you get fat", "maybe he's a daddy"
Concrete descriptions	
- Grew/ became bigger	"grew bigger", "got bigger and bigger", "grew like a tree", "she grew and grew and grew"
- Became fat	"cause she's fat", "got fatter", "she grew and got fat", "always getting fatter"
- Specific body parts larger	"because tummy got bigger", "really big legs", "has fat tummy, face and legs"
Other mechanisms	
- Pregnancy	"she's having a baby", "has a big baby inside", "she's got babies"
- Sleep	"had lots of sleep", "slept very well"
- Magical intervention	"magic", "magic fairy dust"

Negative implications of size	“ate too much”, “ate junk food”, “grew too big”, “her legs touched – she ran away”, “lazy”, “he’s naughty”, “very greedy, Charlie at the chocolate factory”
Positive implications of size	“has lots of energy”, “now he’s very strong”, “she’s healthier”, “he wanted to”, “wanted to grow”, “didn’t like itself the way it was before”
Unrelated or unclear	
Unsure or no response	

Note: N=249

Table 2

Differences Between Time Points (ages 3 to 5) in Percentages of Children Responding According to Each Theme

Themes	Time 1 ^a		Time 2		Time 3		Cochrane Q	p	McNemar p		
	%	(n)	%	(n)	%	(n)			T1 vs. T2	T1 vs. T3	T2 vs. T3
Eating-related response	18.1	(47)	35.1	(91)	49.8	(129)	Q(2) = 64.91, p<.001		$\chi^2 = 21.01^{***}$	$\chi^2 = 57.55^{***}$	$\chi^2 = 12.58^{**}$
- Quantity of food eaten	15.8	(41)	32.0	(83)	41.7	(108)	Q(2) = 42.24, p<.001		$\chi^2 = 20.01^{***}$	$\chi^2 = 39.96^{***}$	$\chi^2 = 5.09^*$
- Quality of food eaten	2.7	(7)	6.6	(17)	17.8	(46)	Q(2) = 46.45, p<.001		$\chi^2 = 5.06^*$	$\chi^2 = 30.72^{***}$	$\chi^2 = 18.23^{***}$
- Likes food/hungry	0.4	(1)	1.2	(3)	1.5	(4)	Q(2) = 1.75, ns				
Lack of physical activity	0	(0)	0.8	(2)	3.1	(8)	Q(2) = 11.56, p=.003		$\chi^2 = 0.5$	$\chi^2 = 6.12^{**}$	$\chi^2 = 3.12^{\dagger}$
Growing, getting larger	15.5	(40)	17.4	(45)	18.5	(48)	Q(2) = .89, ns				
- Growing larger	10.4	(27)	14.3	(37)	16.2	(42)	Q(2) = 3.86, ns				

- Getting fat	1.9 (5)	1.9 (5)	1.2 (3)	Q(2) = .67, ns			
- Specific body parts	3.5 (9)	1.5 (4)	1.2 (3)	Q(2) = .14, ns			
Age (becoming older)	3.1 (8)	6.6 (17)	8.9 (23)	Q(2) = 7.6, p=.022	$\chi^2 = 2.78^{\dagger}$	$\chi^2 = 6.32^*$	$\chi^2 = 0.69$
Other mechanisms							
- Pregnancy	3.1 (8)	2.3 (6)	1.9 (5)	Q(2) = .65, ns			
- Magic/imagination	1.2 (3)	0.4 (1)	0.4 (1)	Q(2) = .45, ns			
Negative implications	11.6 (30)	19.7 (51)	36.3 (94)	Q(2) = 30.56, p<.001	$\chi^2 = 3.18^{\dagger}$	$\chi^2 = 26.22^{***}$	$\chi^2 = 13.30^{***}$
Positive implications	1.9 (5)	4.6 (12)	4.2 (11)	Q(2) = .13, ns			
Unclear responses	13.1 (34)	10.4 (27)	3.9 (10)	Q(2) = 13.14, p <.001	$\chi^2 = .18, ns$	$\chi^2 = 12.60^{***}$	$\chi^2 = 6.91^{**}$
No response/unsure	42.1 (109)	23.9 (62)	13.1 (34)	Q(2) = 64.80, p <.001	$\chi^2 = 22.75^{***}$	$\chi^2 = 54.22^{***}$	$\chi^2 = 10.12^{***}$

^aTime 1 = age 3, Time 2 = age 4, Time 3 = age 5; N = 259

[†]p <.10 * p <.05 ** p <.01 *** p <.001