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VIETNAMESE PARENTS' SATISFACTION WITH GROWTH AND HEALTH OUTCOMES WHEN PROVIDING NUTRITIONAL BEVERAGES TO CHILDREN AT RISK OF UNDERNUTRITION

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Abstract:

Back Ground: Good nutrition is key to achieve optimal growth and health for children, yet pediatric undernutrition persists worldwide, including in Vietnam. When Vietnamese parents have concerns about their child's growth, they commonly choose to supplement the child's diet with a nutritional beverage. Results of numerous clinical studies have shown that feeding a specialized energy- and nutrient-dense pediatric nutritional supplement (PNS) can promote growth and other healthful outcomes in undernourished children.

Objective: In this real-world study in Vietnam, we sought parents' perspectives on their child's growth and health outcomes when nutritional beverage products were given to supplement the diet and counter the risk of undernutrition.

Methods: This was a cross-sectional studyinvolving1200 Vietnamese children who were reported by their parents to be at-risk of undernutrition and who were supplemented with nutritional beverages (PNS[n=600] or other liquid nutritional products [n=600]).

Results: Findings helped us understand parents' perspectives on using nutritional supplements for a child perceived to be at risk of undernutrition. Among parents who gave their children this specialized PNS, approximately 90% were "satisfied" or "agreed" that it helped promote their child's growth and other nutrition-related health outcomes. Specifically, on study questions regarding their child's growth, immunity, physical activity, and eating behaviors, parents who fed itwere1.2 to 1.5 times as likely to give a rating of "very satisfied" or "strongly agree" than were parents who fed other liquid nutritional products; such differences were statistically significant ($P<0.05$).

Conclusions: Parents' high ratings for satisfaction with this specialized PNS product and its ability to promote growth and health are consistent with its efficacy shown in clinical studies. With support from both parents and healthcare professionals, daily consumption of such PNS product is recognized to have high value as a way to promote growth and health of an undernourished child.

Introduction:

Childhood undernutrition, as evidenced by poor growth, is still very common in many parts of the world today.[1-5]In fact, recent growth statistics show that nearly 150 million children under 5-years-old are stunted, and 50 million are wasted.[2] Millions more children experience undernutrition that is less severe but has negative effects on growthnonetheless.[6]Such undernutrition occurs when nutrient intake does not meet nutrient needs, that is, when a child experiences shortfalls in protein and energy intake, has deficiencies of growth-related micronutrients, or both.[7]

Healthcare professionals are particularly concerned about the consequences of pediatric undernutrition. Inadequate nutrition early in life impairs growth in childhood and jeopardizes a child's likelihood of reaching full linear growth potential.[3,8-14] Beyond poor growth, undernutrition can also result in compromised physical or mental development.[6,7,15]Undernourished children are more susceptible to infections, and severe malnutrition increases the risk of death.[16,17]Early undernutrition is also associated with developmental delays that impair cognitive outcomes and can limit productive potential as adults.[18]

Parents are likewise concerned when they perceive their child is not eating or growing as much as the child's peers. Parents seek advice from healthcare professionals, parent peers, and other educational resources for solutions to increase their child's weight and height. For children who are short or underweight, healthcare professionals have consistently advised nutritional interventions such as dietary counseling[19]and feeding oral nutritional supplements.[20-22]There is considerable clinical evidence to support the use of PediaSure (Abbott Laboratories), a specialized pediatric nutrition supplement (PNS)product which was developed more than 30 years ago to help fill the nutritional gaps in children.[20]PNS products are energy- and nutrient-dense, i.e., have a

caloric density ≥ 1 kcal/mL (after reconstitution if in powder format) with macronutrients in balanced proportions within recommended ranges (e.g., Acceptable Macronutrient Distribution Ranges, AMDR) and high-quality proteins such as dairy protein, and are complete with all essential nutrients to help meet daily nutrient needs. Besides PNS, parents also often choose other types of liquid nutritional products such as various dairy and non-dairy nutritional beverages (including powder products that can be reconstituted) to promote nutritional intake and growth for their children.

When experts recently studied the efficacy of supplementation of this specialized PNS product for treating Vietnamese children with stunting, they found that daily consumption for a period of 6 months effectivelyreduced the rate of stunting, wasting, and underweight status.[23] Accordingly, the objective of our current study was to determine whether Vietnamese parents' expectations for growth- and health-related benefits were similarly met. We also compared the opinions of parents whose children were given this PNS product in comparison with the perception and satisfaction of parents whose children were given other liquid nutritional products.

Methods:

Study Design and Ethical Approval:

This cross-sectional study used survey methods to assess parental perception and satisfaction with feeding liquid nutritional products on the growth and other health outcomes of Vietnamese children. The survey was conducted by Intage Inc (Vietnam), a consumer-tracking research agency. The study's protocol, survey instruments, and informed consent form were approved by the Western Institutional Review Board (WIRB; Puyallup, WA, USA). Written informed consent was obtained from all participants.

Participants:

Participants were recruited in four cities in Vietnam (Ho Chi Minh, Hanoi, Cantho, Danang) using the local Abbott Customer Relationship Management database and the Intage customer database as sources. According to database privacy agreements, members had approved of being contacted to participate in future studies. All potential participants were checked for eligibility by the Intage study team. If the participant was eligible at the time of recruitment and indicated consent to proceed, he or she was then visited by the Intage study team for a formal face-to-face interview. The interviewer explained the study process, obtained consent, and then proceeded with the verification of eligibility using a questionnaire.

Eligibility and Exclusion Criteria:

The eligibility of the respondents was determined using a screening questionnaire. For inclusion, parents must have concern(s) about their child(ren) (14 months to 6 years of age) being at risk of undernutrition. If a parent was concerned about more than one child, the most seriously concerning child was reported for the survey study. To address the concern(s), the parents must have (1)fed the child amilk-drink product to improve his or her nutritional status, and (2) the child had consumed the product for at least 2 months prior to the parent's participation in this survey study. If more than one product was being used, the primary product should have been used for≥ 66% of the total liquid nutritional product intake, as determined by parental self-reporting. Surveyed parents were grouped as: (1) the PNS group who had primarily fed their children a specialized PNS product (PediaSure), or (2) the "other" group who had fed their children other liquid nutritional products. These products included other PNS brands, growing-up milk (GUM) drinks, and other nutritional beverages (e.g., fortified dairy or non-dairy beverages). GUM products are fortified toddler milk products designed to help reduce the risk of nutritional inadequacy. These products usually have an energy density similar to regular milk (0.6-0.8 kcal/ml). For those children using "other" products, parent's inclusion in the survey required that the child had not been fed any Abbott nutritional product in the last 6 months.

Study Questions:

The questionnaire included demographic questions along with other questions intended to assess parental perception and satisfaction with their child's growth, appetite, physical activity, diet, and immunity after the child had consumed liquid nutritional products. Developed by Abbott, the questionnaire was informed by literature reviews and textbook guidance on health-related study instruments, and by consultation with other nutrition survey experts.

Statistical Analyses:

We used propensity-score matching to limit confounder effects in group-to-group comparisons, thus creating a dataset that mimicked a randomized, controlled experiment. Participants in the PNS group were matched with participants in the "other" group on the following parameters: parental concerns for the child, child's age and sex, duration of liquid nutritional product use, parent's educational level, household income, heights and weights of parents, number of children in the household, smoking in the home, parent's marital status, and the child's use of supplemental vitamins, minerals, and/or fish oil. To ensure that the PNS group and the "other" group were balanced, we reviewed propensity scores in the two matched cohorts by distribution and by numerical summaries (mean differences) of individual covariates.

For response ratings on Visual Analog Scale (VAS) scores, we used a score of 7 (out of 10) as the cutoff for "agreed/satisfied" (i.e., score ≥ 7 as satisfied or agreed) and a score of 9 (out of 10) as the cutoff for

"strongly agreed/very satisfied" (i.e., score ≥ 9 as strongly agreed or very satisfied). We calculated the percentage of parents responding "agreed/satisfied" or "strongly agreed/very satisfied" for each group and question. Between-group VAS scores were compared by analysis of covariance (ANCOVA). Logistic regression analysis was used to compare the proportions of respondents who scored "strongly agreed/very satisfied" in the two groups. Odds ratios from the models were converted to relative risks. We also used ANCOVA to compare changes in scores for weight or height ratings before/after product consumption (PNS vs "other" group). The result from the question asking the total number of sick days in the past 2 months were count data, which were analyzed using negative binomial regression between the two groups. Parental concerns for their child, child's age and sex, duration of milk-drink use, parental education, household income, heights and weights of parents, number of children in the household, smoking in the home, parental marital status, and child's use of supplemental vitamins, minerals, and/or fish oil were included in the statistical models as covariates.

We calculated the sample size needed to detect differences based on cluster-randomized sampling with matched pairs and with an assumed 10% between-group difference in the scale of satisfaction. Such calculations found that 585 matched pairs were needed with a sample size of two individuals per cluster to achieve 80% power to detect an average paired-cluster difference of 10% using a 2-sided z-test at the 0.05 significance level. Assuming some participant attrition, we targeted 600 responders per study group.

Results:

Participant Characteristics:

Parents concerned about their child's shortness or underweight status commonly rely on nutritional supplements to promote catch-up growth. For this study, 1200 parents completed a survey about perceptions regarding their child's use of liquid nutritional products--600parents of children consuming the specialized PNS and 600 parents of children consuming "other" liquid nutritional products. Among the 600 parents who were feeding "other" liquid nutritional products, 103 (17%) were primarily using another brand of PNS, while 248 (41%) were using products categorized as GUM. The rest of the parents fed their children other types of liquid nutritional products. Prior to propensity-score matching, the mean age of the children was 39.7±16.3 months, and the median age was 37 months. Parents with concern about their child's growth had fed the liquid nutritional product an average of 10.6 months. Among the 1200 children, 52% were male, 56.7% had parents with a college degree or higher, 52.3% had a smoker in the house, and 95% of the households had 1 or 2 children. About half of the parents (54.3%) also provided other kinds of nutritional supplements (e.g., vitamins, minerals, fish oil). The average weight (± standard deviation) was 65.3±7.2 kg for the fathers and 51.9±5.9 kg for the mothers. The average height was 168.1±5.1 cm for the fathers and was 156.9±4.6 cm for the mothers. Detailed demographic information is provided in Supplemental Table 1.

Most parents reported more than one concern about their child's growth (Table 1). "Weight lower than other kids" was the response chosen most frequently (78.8% of parents). "Height shorter than other kids" was the second most frequent response (54.5% of parents). In addition, nearly half of the parents had concerns about the eating behaviors of their children including picky eating as well as eating very little which indicates that parents treated eating problems and potential nutritional inadequacy as a possible detriment to their children's growth and health.

Parental Perceptions on Growth and Health of Their Child:

We found more than 90% of the 600 Vietnamese parents surveyed were "satisfied" with the specialized PNS product or "agreed" that the product helped support the growth and health of their child or would "recommend" the product to other parents with the same concerns (Table 2). In fact, one-third to half of the parents were "very satisfied" with the product or "strongly agreed" with the PNS product benefits. The rates of "satisfied" and "very satisfied" of the "other" product group are numerically lower (Table 2).

The least-squares means of the study questions for both the specialized PNS and "other" product groups are summarized (Table 3), adjusted for covariates. The parents from the specialized PNS group gave significantly higher scores for all the questions based on VAS rating than the "other" product group ($P<0.05$) as indicated by the positive coefficient estimates from ANCOVA, adjusted for covariates (Table 4).There was no significant difference between the two groups in the number of sick days in the 2 months prior to the study (Table 4). The parents of the specialized PNS group rated a better improvement in their child's weight and height based on the 7-point Likert scale since the introduction of the product compared with the "other" group ($P<0.05$).

We further explored differences in the likelihood that a parent would give a "very satisfied" or "strongly agreed" rating by using logistic regression analysis to compare responses in the specialized PNS group with the "other" product group. The specialized PNS group had significantly higher odds of giving a "very satisfied" or "strongly agreed" rating when compared with the "other" product group for all the questions based on VAS ($P<0.05$) except for the question "Recovered faster from illness than before" (Data not shown). Odds ratios were then converted to relative risk values for easier interpretation (Table 5).Parents from the specialized PNS group were 1.35 times as likely to be "very satisfied" with the use of this product to support their child's

growth (P<0.01). Parents from the specialized PNS group were 1.2 to 1.5 times as likely to rate "strongly agree" for the questions that the product helped support growth and health of their child (such as "child growth is better than before", "faster weight/height gain than peers", "more energy to play longer", and "sick less often") than were parents in the "other" product group (P<0.05) except for the question mentioned above (Table 5).

We performed additional subgroup analyses comparing responses of parents in the specialized PNS group with two subgroups within the "other" product group, namely other PNS products and GUM products. The parents from the specialized PNS group also gave significantly higher scores for some of the questions based on VAS rating than these two subgroups (Supplemental Table 2).Correspondingly, these parents were also 1.3 to 1.7 times as likely than parents using other types of PNS products to give a "very satisfied or strongly agreed" rating (P<0.05) for a few growth and health-related questions such as "child growth better than before", "faster growth than peers", "more confident getting the right nutrition for growth/development", and "sick less often" (Supplemental Table 3). Further, parents from this specialized PNS group were 1.4 to 1.9 times as likely than parents using GUM products to give a "very satisfied or strongly agreed" rating (P<0.01) for all questions except for the questions" Gained height faster than before" and "Recovered faster from illness than before" (Supplemental Table 3).

Discussion:

A wide range of clinical studies have been performed to assess specific measures of PNS safety and efficacy in children.[20-28] However, what matters most to anxious parents is to feel they have made the right choices to help their too-small or underweight child catch up in growth with his or her peers. A previous study has shown that if parents have a concern about their child's feeding, the child is likely to have growth problems.[29]In some cases, the problem may be related to insufficient food availability or lack of dietary diversity;[27] in other cases, the underlying problem may reflect a child's true but transient picky-eating behaviors.[30,31] For all of these children, catch-up growth is the goal, and parents are correct to recognize a need for nutritional intervention.

Because of the important role parents play in spotting poor eating and growth shortfalls in their children, our study was designed to seek feedback from a large number of parents who gave their children liquid nutritional products when they were concerned about the child's growth.

Key findings of our study were that a vast majority of parents were satisfied with their experience in feeding the specialized PNS product, and they agreed that their child had experienced positive benefits in terms of growth, immunity, physical activity, and eating behaviors (Box 1). In fact, using a Likert scale, parents from the specialized PNS group were 1.2 to 1.5 times as likely to be "very satisfied" or "strongly agree" than were parents in the "other" products group.

Box 1: Key messages based on survey responses from parents who fed their children a complete, balanced PNS product

- 98%of parents surveyed were "satisfied" with the specialized PNS product, and more than 90% "agreed" that this PNS product promoted growth and health in their children in general.
- In comparison with parents feeding "other" liquid nutritional products, those feeding this specialized PNS product were significantly more likely to be "very satisfied" and to "strongly agree" with positive statements on their child's growth, immunity, physical activity, and eating behaviors.
- These high parental satisfaction ratings for this PNS product are consistent with strong evidence of its efficacy in clinical research trials.

Our survey was unique because it sought feedback on parents' perceptions and satisfaction with the usage of a unique PNS product in a real-world setting in Vietnam. We underscore the fact that these parental perceptions complement parallel clinical evidence from Vietnam on measured growth benefits for children on this PNS product.[23] Specifically, children with underweight or stunted growth showed (mean age 35 months) significant increases in median height-for-age Z-scores (0.25 units), weight-for-height Z-scores (0.72 units), and weight-for-age Z-scores(0.65 units) from baseline to 6 months of the PNS intervention (p<0.0001).[23] Notably, approximately 40% of children receiving this specialized PNS recovered from stunting status at 6 months (p<0.0001).[23] Further, there is additional evidence for the efficacy of this PNS product for catch-up growth and reduced rates of infections based on studies from around the world in the Philippines and Taiwan,[32,33] in Germany,[34] and in India.[25,26]

Strengths and Limitations of this Survey and Its Analysis:

Our study results are strong in that they represent real-world findings based on a large number of parents who reported perceptions in face-to-face interviews with trained professionals. We used rigorous statistical analyses for between-group comparisons, including propensity matching to minimize confounding. Our study results were insightful because we compared information obtained from parents using a specialized PNS product with perceptions and satisfaction of parents who used "other" products. On the other hand, our study did have limitations. Feeding amounts and frequencies were not controlled, and within the "other" group, brands and product nutritional content differed. As well, there may have been some recall bias in parental reporting of feeding results.

The Way Forward:

Many parents become aware that their child is underweight or short in comparison with other children of the same age when they take their child to a pediatric clinic or community practice. Here physicians and other health professionals need to identify the likely cause of the growth shortfall. Healthcare professionals must differentiate between normally small children of small parents, children experiencing food insufficiency due to the family's poor socioeconomic status, and children with gastrointestinal abnormalities or other medical problems that limit nutrient intake and absorption.[35-37] In other cases, the professional may determine that the child is displaying picky-eating behaviors, which are common and transient as the child builds experiences with solid food.[22,31]In a small number of stunting and underweight children, poor growth may be related to serious feeding difficulties, which require referral to a specialist for treatment.[38] In all of these cases, physicians and nurses in pediatric care are in a unique position to help parents address nutritional issues before growth issues have serious long-term consequences. Medical professionals thus need adequate education and training to counsel parents about their child's nutritional status and growth. To this end, there has been a recent and resounding call for greater emphasis on nutrition care in medical schools, residency training, and continuing education for caregivers in practice.[39-42]

Conclusion:

Parents worry when they sense their child is not growing as well as his or her peers. PNS products and other liquid nutritional products are commonly used to promote catch-up growth in children who are short or underweight for their age. Our study results rated the tested specialized PNS product highly in terms of product satisfaction and agreement with its positive effects on enhancing their child's growth and health. Notably, such findings were consistent with the demonstrated efficacy of this PNS in many clinical studies. With support from parents and healthcare professionals alike, such a product is recognized to have high value as a way to promote catch-up growth and improve wellness in children who are not growing normally due to undernutrition.

Table 1: Parental concerns about their child's growth and health: motivators to feed nutritional supplements

Concerns	Specialized PNS Group (n=600)	"Other" Product Group (n=600)
Weight Lower than Other Children	484 (81%)	462 (77%)
Underweight According to Growth Chart/Doctor Diagnostic	161 (27%)	158 (26%)
Height Shorter than Other Kids	343 (57%)	311 (52%)
Short Height According to Growth Chart/Doctor Diagnostic	139 (23%)	116 (19%)
Picky Eating	290 (48%)	276 (46%)
Little Appetite for Food/Eats Very Little	270 (45%)	272 (45%)
Gets Sick Easily or Frequently	111 (19%)	114 (19%)

n (%) of parents reporting concerns

Table 2: Percentage of parents who were "satisfied / agreed" and "very satisfied/strongly agreed" with statements that the product they have chosen was beneficial to their child's growth and health. Based on VAS scores from 0 to 10 with a VAS score ≥ 7 defined as "satisfied/agreed" and VAS score ≥ 9 defined as "very satisfied/strongly agreed".

Questions	Specialized PNS Group		"Other" Group	
	% Satisfied / Agreed	% Very Satisfied / Strongly Agreed	% Satisfied / Agreed	% Very Satisfied/ Strongly Agreed
How satisfied with milk-drink for child's growth?	98	49	96	38
How likely to recommend to friends concerned about child's growth?	96	49	94	41
Child growth better than before?	93	45	90	34
Gained weight faster than before?	93	42	88	34
Gained height faster than before?	91	34	87	29
Faster growth than peers?	87	38	82	28
Gained more weight than peers?	87	34	82	28
Gained more height than peers?	86	34	82	28
More energy to play longer?	98	52	97	41
Improved appetite?	96	47	93	35
More confident getting right nutrition for growth/development?	98	52	97	39
Eating greater variety of foods?	95	36	93	30
Sick less often?	97	47	90	35
Recovered faster from illness than before?	94	27	89	28

Table 3: The least-squares means of the study questions for both the specialized PNS and "other" product groups (adjusted for covariates).

Questions	Specialized PNS	"Other" Product
How satisfied with milk-drink for child's growth?	8.474	8.204
How likely to recommend to friends concerned about child's growth?	8.531	8.253
Child growth better than before?	8.297	7.961
Gained weight faster than before?	8.183	7.955
Gained height faster than before?	8.058	7.757
Faster growth than peers?	7.978	7.622
Gained more weight than peers?	7.929	7.655
Gained more height than peers?	7.852	7.619
Weight change?*	0.915	0.782
Height change?*	0.786	0.711
More energy to play longer?	8.482	8.202
Current physical activity level score	8.460	8.192
Improved appetite	8.350	8.051
Current appetite level	8.209	7.902
More confident getting right nutrition for growth/development	8.526	8.246
Eating a greater variety of foods	8.132	7.911
Sick less often	8.351	7.852
No. days sick past 2 months[#]	1.908	2.171
Recovered faster from illness than before	7.963	7.696

Based on VAS scores from 0 to 10 with higher scores indicating more agreement/higher satisfaction except for the questions with *which were based on the change of scales on a 7-point Likert scale or [#] which was based on the count data. Parental concerns for their child, child's age and sex, duration of milk-drink use, parental education, household income, heights and weights of parents, number of children in the household, smoking in the home, marital status, and use of supplemental vitamins, minerals, and/or fish oil were included in the statistical models as covariates.

Table 4: Point estimate and 95% confidence interval (CI) of the ANCOVA coefficient representing the difference in mean VAS scores between the specialized PNS group with the "other" product group

Questions	Coefficient Estimates	95% CI
How satisfied with milk-drink for child's growth?	0.300**	(0.189, 0.411)
How likely to recommend to concerned friends? Concerned about child's growth?	0.311**	(0.189, 0.434)
Child growth better than before?	0.366**	(0.236, 0.497)
Gained weight faster than before?	0.254**	(0.118, 0.390)
Gained height faster than before?	0.316**	(0.181, 0.452)
Faster growth than peers?	0.379**	(0.232, 0.525)
Gained more weight than peers?	0.290**	(0.138, 0.443)
Gained more height than peers?	0.251**	(0.103, 0.400)
Weight change?^	0.138**	(0.079, 0.197)
Height change?^	0.075*	(0.004, 0.145)
More energy to play longer?	0.302**	(0.188, 0.416)
Current physical activity level score	0.293**	(0.182, 0.404)
Improved appetite	0.320**	(0.197, 0.442)
Current appetite level	0.318**	(0.198, 0.438)
More confident getting right nutrition growth/development	0.299**	(0.180, 0.418)
Eating a greater variety of foods	0.228**	(0.112, 0.345)
Sick less often	0.504**	(0.374, 0.635)
Number of days sick in past 2 months[#]	-0.126	(-0.306, 0.054)
Recovered faster from illness than before	0.224*	(0.029, 0.419)

*P<0.05; **P<0.01; ^Based on the 7-point Likert scale instead of VAS; [#]Count data analyzed using negative binomial regression instead of ANCOVA. Parental concerns for their child, child's age and sex, duration of milk-drink use, parental education, household income, heights and weights of parents, number of children in the household, smoking in the home, marital status, and use of supplemental vitamins, minerals, and/or fish oil were included in the statistical models as covariates.

Table 5: Comparing the specialized PNS group with the "other" product group (adjusted for covariates), relative risk values indicate the ratio in the likelihood of a "very satisfied" or "strongly agree" rating on a study question.

Questions	Relative Risk	95% CI
How satisfied with milk-drink for child's growth?	1.348**	(1.185, 1.510)
How likely to recommend to friends concerned about child's growth?	1.256**	(1.105, 1.405)
Child growth better than before?	1.394**	(1.211, 1.581)
Gained weight faster than before?	1.277**	(1.103, 1.457)
Gained height faster than before?	1.233*	(1.036, 1.446)
Faster growth than peers?	1.487**	(1.260, 1.727)
Gained more weight than peers?	1.308**	(1.094, 1.540)
Gained more height than peers?	1.348**	(1.124, 1.591)
More energy to play longer?	1.283**	(1.133, 1.431)
Current physical activity level score	1.375**	(1.216, 1.531)
Improved appetite	1.423**	(1.246, 1.601)
Current appetite level	1.438**	(1.230, 1.655)
More confident getting right nutrition for growth/development	1.226**	(1.087, 1.363)
Eating a greater variety of foods	1.322**	(1.114, 1.545)
Sick less often	1.524**	(1.328, 1.723)
Recovered faster from illness than before	0.952	(0.667, 1.334)

*P<0.05; **P<0.01.Parental concerns for their child, child's age and sex, duration of milk-drink use, parental education, household income, heights and weights of parents, number of children in the household, smoking in the home, marital status, and use of supplemental vitamins, minerals, and/or fish oil were included in the statistical models as covariates.

Supplemental Table 1: Demographic information for parents surveyed and their children before matching

Parameter (units)	Specialized PNS Group	"Other" Product Group
Child's age (Mean ± SD, months)	40.4 ± 16.2	38.9 ± 16.4
Child's sex (male %)	55.2	48.8
Duration of formulation use (Mean ± SD, months)	9.6 ± 7.3	11.5 ± 8.3
Smoker in the household (%)	49.3	55.3
Additional supplement usage (%)	52.8	55.8
Paternal weight (Mean ± SD, kg)	65.1 ± 6.9	65.4 ± 7.4
Maternal weight (Mean ± SD, kg)	51.7 ± 5.7	52.2 ± 6.0
Paternal height (Mean ± SD, cm)	168.2 ± 4.8	168.1 ± 5.3
Maternal height (Mean ± SD, cm)	156.9 ± 4.6	156.9 ± 4.7

Supplemental Table 2: Point estimate and 95% confidence interval (CI) of the ANCOVA coefficient representing the difference in mean VAS scores between the specialized PNS group and the other two subgroups (other PNS products and GUM products).

Questions	The specialized PNS vs Other PNS		The specialized PNS vs GUM	
	Coefficient Estimates	95% CI	Coefficient Estimates	95% CI
How satisfied with milk-drink for child's growth?	0.228*	(0.036, 0.419)	0.277**	(0.141, 0.413)
How likely to recommend to friends concerned about child's growth?	0.148	(-0.049, 0.345)	0.315**	(0.168, 0.463)
Child growth better than before?	0.286**	(0.072, 0.500)	0.272**	(0.114, 0.430)
Gained weight faster than before?	0.255*	(0.043, 0.467)	0.363**	(0.198, 0.528)
Gained height faster than before?	0.173	(-0.052, 0.398)	0.310**	(0.148, 0.471)
Faster growth than peers?	0.219	(-0.026, 0.464)	0.316**	(0.136, 0.496)
Gained more weight than peers?	0.123	(-0.115, 0.362)	0.224*	(0.051, 0.397)
Gained more height than peers?	0.059	(-0.182, 0.300)	0.279**	(0.092, 0.467)
Weight change?^	0.066	(-0.029, 0.160)	0.147**	(0.072, 0.222)
Height change?^	0.067	(-0.064, 0.197)	0.179**	(0.086, 0.273)
More energy to play longer?	0.181	(-0.012, 0.374)	0.313**	(0.180, 0.447)
Current physical activity level score	0.204*	(0.012, 0.397)	0.377**	(0.240, 0.514)
Improved appetite	0.165	(-0.030, 0.361)	0.466**	(0.324, 0.609)
Current appetite level	0.128	(-0.063, 0.319)	0.377**	(0.190, 0.483)

More confident getting right nutrition for growth/development	0.198*	(0.013, 0.382)	0.414**	(0.277, 0.551)
Eating a greater variety of foods	0.171	(-0.037, 0.379)	0.236**	(0.095, 0.378)
Sick less often	0.384**	(0.187, 0.582)	0.411**	(0.253, 0.570)
No. days sick past 2 months#	-0.470**	(-0.766, -0.174)	-0.246**	(-0.455, -0.037)
Recovered faster from illness than before	-0.076	(-0.368, 0.216)	0.123	(-0.084, 0.330)

*P<0.05; **P<0.01;^Based on the change of scales on a 7-point Likert scale instead of VAS; #Count data analyzed using negative binomial regression instead of ANCOVA. Parental concerns for their child, child's age and sex, duration of milk-drink use, parental education, household income, heights and weights of parents, number of children in the household, smoking in the home, marital status, and use of supplemental vitamins, minerals, and/or fish oil were included in the statistical models as covariates.

Supplemental Table 3: The relative risk values which indicate the difference in likelihood in giving a "very satisfied or strongly agree" rating on the study questions when comparing the specialized PNS group with the other two subgroups (other PNS group and GUM group), adjusted for covariates.

Questions	**The specialized PNS vs Other PNS**		**The specialized PNS vs GUM**	
	Relative Risk	**95% CI**	**Relative Risk**	**95% CI**
How satisfied with milk-drink for child's growth?	1.220	(0.951,1.486)	1.540**	(1.268, 1.815)
How likely to recommend to friends concerned about child's growth?	1.157	(0.897,1,414)	1.392**	(1.159, 1.624)
Child growth better than before?	1.470**	(1.111,1.838)	1.470**	(1.199, 1.749)
Gained weight faster than before?	1.207	(0.911,1.516)	1.568**	(1.268, 1.881)
Gained height faster than before?	1.347	(0.969,1.768)	1.163	(0.910, 1.447)
Faster growth than peers?	1.587**	(1.141,2.072)	1.663**	(1.313, 2.034)
Gained more weight than peers?	1.064	(0.765, 1.402)	1.518**	(1.161, 1.920)
Gained more height than peers?	1.203	(0.846, 1.612)	1.644**	(1.290, 2.026)
More energy to play longer?	1.291*	(1.013,1.560)	1.627**	(1.357, 1.891)
Current physical activity level score	1.352*	(1.065, 1.626)	1.738**	(1.458, 2.011)
Improved appetite	1.401*	(1.072, 1.729)	1.947**	(1.630, 2.253)
Current appetite level	1.389*	(1.031, 1.761)	1.515**	(1.215, 1.834)
More confident getting right nutrition for growth/development	1.420**	(1.126,1.696)	1.673**	(1.405, 1.935)
Eating a greater variety of foods	1.040	(0.753, 1.365)	1.557**	(1.210, 1.942)
Sick less often	1.678**	(1.290,2.053)	1.587**	(1.301, 1.877)
Recovered faster from illness than before	0.830	(0.431, 1.493)	0.782	(0.478, 1.246)

*P<0.05; **P<0.01.Parental concerns for their child, child's age and sex, duration of milk-drink use, parental education, household income, heights and weights of parents, number of children in the household, smoking in the home, marital status, and use of supplemental vitamins, minerals, and/or fish oil were included in the statistical models as covariates.

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