

Perceived Parental Social Support and Moderate-to-Vigorous Physical Activity in Children at Risk of Obesity

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Purpose: Identification of factors that relate to physical activity behavior in children at higher risk for weight problems—namely, children with obese parents—is key to informing the development of effective interventions to promote physical activity and reduce obesity. The purpose of our study was to examine children’s perceptions of parental social support for physical activity and the associations between these perceptions and health-enhancing physical activity behavior. Our specific objectives were to: (a) compare perceptions of parental support in children across gender and weight status; (b) compare perceptions of support across source (mother, father) and type (tangible, intangible) in normal-weight and overweight girls and boys; and (c) examine the associations between perceptions of parental support and moderate-to-vigorous physical activity (MVPA) behavior. **Method:** We used data collected from the Quebec Adiposity and Lifestyle Investigation in Youth, an investigation of Caucasian children with at least 1 obese biological parent. We included in the

Submitted August 8, 2012; accepted August 31, 2013.

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analyses children ($n = 560$, $M_{\text{age}} = 9.6$ years, 55% boys, 41% overweight/obese) with data on parental support assessed using a self-report questionnaire and data on MVPA assessed using accelerometers. **Results:** Multivariate analyses of variance indicated that perceptions of support differed by children's gender and weight status. Paired-samples t tests showed that children reported more intangible than tangible support. Regression analyses demonstrated that perceptions of paternal tangible support were positively related to MVPA in normal-weight girls, but only a small amount of variance was explained. **Conclusions:** Children's gender and weight status need to be considered when studying parental support for physical activity. Further, type and source of support should be differentiated in future research.

Keywords: body mass index, perceived social support, physical exercise, youth

Excess weight in childhood is associated with numerous health problems (Lobstein, Baur, Uauy, & Force, 2004). Around 25% of children are considered overweight or obese (Janssen et al., 2005), and some children are considered at higher risk for becoming overweight or obese compared with others. Notably, because they are more likely to become overweight or obese, a specific subgroup of children that constitutes an important higher-risk group includes those with overweight or obese parents (Keane, Layte, Harrington, Kearney, & Perry, 2012; Svensson et al., 2010). For example, Keane et al. (2012) reported that 46.2% of children with overweight or obese parents were themselves overweight or obese compared with 14.4% of children with normal-weight parents. Providing those children who are at higher risk for becoming overweight or obese with evidence-based interventions is critical to tackle the obesity epidemic, thereby reducing the short- and long-term consequences of obesity.

Physical activity at moderate-to-vigorous intensity can help prevent weight gain and maintain a healthy body weight in children and adolescents (Hills, Okely, & Baur, 2010). However, most children do not engage in moderate-to-vigorous physical activity (MVPA) for a duration that is optimal for weight management (Centers for Disease Control and Prevention, 2006; Colley et al., 2011). In Canada, only 9% of children participate in MVPA for the recommended 60 min per day, and girls are less active than boys (Colley et al., 2011). Moreover, overweight and obese children are less active than their normal-weight counterparts (Janssen et al., 2005; Treuth et al., 2007). Identifying modifiable factors associated with MVPA is needed to inform the development of effective intervention strategies to increase MVPA levels.

Social support is a modifiable factor associated with physical activity behavior in children (Trost et al., 2003). Because children spend substantial amounts of time with their families, parents can have considerable influence on their child's physical activity behavior by providing tangible (e.g., facilitating access to facilities and equipment) and intangible support (e.g., encouragement, praise, advice, companionship, emotional nurturance). Social support is usually measured in studies either by having parents report the frequency with which they enact supportive behaviors or by having children report the level of support they perceive

their parents provide (i.e., perceived social support). However, children and parents often have discordant perceptions of the support provided by parents, and it is children's perceptions of the support that is a better determinant of their physical activity behavior (Barr-Anderson, Robinson-O'Brien, Haines, Hannan, & Neumark-Sztainer, 2010). Perceived parental support is positively linked to physical activity behavior in children and adolescents with diverse sociodemographic backgrounds (Beets, Cardinal, & Alderman, 2010; Pugliese & Tinsley, 2007; Sabiston & Crocker, 2008; Zabinski, Saelens, Stein, Hayden-Wade, & Wilfley, 2003). For example, Pugliese and Tinsley (2007) reported that children and adolescents were more likely to be inactive if they perceived that their parents did not provide support for physical activity. These findings provide an evidence base for focusing on children's perceptions of parental support in research, rather than parents' accounts of the support they believe they provide to their children.

Several other issues challenge the extant literature examining the associations between perceptions of perceived parental support and physical activity behavior. While some researchers distinguish between *sources* of social support such as parents, peers, and siblings (e.g., Beets, Vogel, Forlaw, Pitetti, & Cardinal, 2006; Sabiston & Crocker, 2008; Spink, Wilson, & Ulvick, 2012), few have examined the unique associations of maternal and paternal support with physical activity behavior. In fact, 60 out of 71 studies reviewed by Trost and Loprinzi (2011) used a single index of parental support. Of the 11 studies that examined maternal and paternal support separately, paternal support was significantly associated with adolescents' physical activity behavior in 6 studies, whereas maternal support was associated with adolescents' physical activity behavior in only 4 studies (Trost & Loprinzi, 2011). Therefore, the distinction between the different sources of perceived parental support is especially important when physical activity behavior is the outcome variable.

In addition, few researchers have studied different *types* of parental support within a single study (e.g., Beets et al., 2006; Sabiston & Crocker, 2008; Spink et al., 2012). Although a widely accepted definition is lacking, there is consensus that social support is the provision of aid and assistance through interpersonal exchange and relationships (Beets et al., 2010). It can come in various forms such as

emotional, motivational, instrumental, and informational support (Beets et al., 2010). These forms can be categorized into two types: indirect or intangible (e.g., encouragement, discussion of the importance of physical activity), and direct or tangible (e.g., provision of transportation, watching or being active with the child; Beets et al., 2010). In addition to the prospect that maternal and paternal support may be differentially related to physical activity behavior, different types of social support may also relate differently to this behavior (Beets et al., 2010). Therefore, researchers should distinguish between source (i.e., mothers and fathers) as well as type (i.e., intangible and tangible) of perceived support to better understand the parental support and physical activity association in children.

Further, consideration of parents' and children's weight status is generally lacking in studies investigating this relationship. It is important to determine if perceived parental support is associated with physical activity behavior in children with at least one obese parent because (a) the prevalence of obesity in adults is high and increasing and (b) children living with overweight and obese parents are more likely to be overweight or obese (Keane et al., 2012; Svensson et al., 2010). Thus, these children would benefit from intervention. It is also important to determine if perceptions of parental support differ between normal-weight and overweight children and to test if these perceptions influence physical activity behavior in the same way in children of differing weight status (e.g., Springer, Kelder, & Hoelscher, 2006). Normal-weight children tend to report more parental support for physical activity than do overweight children (Zabinski et al., 2003), and the association between social support and physical activity may differ across weight status (Trost, Kerr, Ward, & Pate, 2001). Parents may be aware of the health risks related to the overweight status of their child, and they may acknowledge that an inactive lifestyle is a contributing factor to their child's weight problem. This may prompt parents to attempt to increase their child's physical activity behavior. However, parents may struggle to do this in a supportive manner and may inadvertently pressure their child. Children could therefore interpret their parents' actions and attitudes negatively and as more controlling (Wilson & Spink, 2011). Consequently, overweight children may report lower levels of social support for physical activity.

The purpose of our study was to examine children's perceptions of parental social support and to estimate the associations between these perceptions and MVPA behavior in those at higher risk for becoming overweight or obese due to having at least one obese parent. Our three specific objectives were: (a) to determine if children's perceptions of maternal and paternal tangible and intangible support differ by children's gender and weight status; (b) to compare perceptions of maternal and paternal levels of support, as well as tangible and intangible levels of support in normal-

weight boys, normal-weight girls, overweight boys, and overweight girls; and (c) to examine the associations between children's perceptions of maternal and paternal tangible and intangible support and MVPA behavior. To our knowledge, this was the first study that examines different types and sources of perceived social support in children at higher risk for becoming overweight or obese. This is necessary to determine if promoting social support has the potential to increase physical activity levels in children living with overweight or obese parents or if different intervention strategies are needed for these children in comparison to children with lower familial risk factors for obesity.

METHOD

Procedures

For this study, we used baseline data from the Quebec Adiposity and Lifestyle Investigation in Youth (QUALITY), an ongoing longitudinal investigation of 630 Caucasian children aged 8 to 10 years old at study inception. A detailed description of QUALITY is available elsewhere (Lambert et al., 2011). Briefly, we used a school-based recruitment strategy to recruit children in Grades 2 to 5 in the province of Quebec, Canada, with at least one biological parent with a body mass index (BMI) ≥ 30 kg/m² or an elevated waist circumference (> 102 cm for fathers; > 88 cm for mothers). Interested families contacted the research assistant to confirm eligibility and to schedule a full-day appointment at the Centre Hospitalier Universitaire (CHU) Sainte-Justine in Montréal or at the Hôpital Laval in Quebec City. During this baseline visit in 2005–2008, a research assistant administered a questionnaire to each child individually (without their parents present) by reading the instructions aloud and ensuring the child understood the questions. We then measured children's MVPA levels using accelerometers in the week following the visit. The CHU Sainte-Justine and the Laval University ethics review boards approved the QUALITY study. Parents provided written informed consent, and children provided assent.

Participants

Of the 630 children recruited (response = 48% of eligible children), 560 ($M_{\text{age}} = 9.6$ years, $SD = 0.9$ years; 55% boys) provided valid accelerometer data and were included in the analyses. Compliance with wearing the accelerometers was excellent (median = 7 days, range = 1–7, $M = 6.9$ days), and the average daily accelerometer wear time was 12.3 hr ($SD = 2.19$ hr). Fifty-four percent of participants lived in households with incomes $> \$80,000$, and 41% were overweight or obese (i.e., > 85 th percentile of the age- and gender-specific BMI percentile). Based on

the QUALITY inclusion criteria, all children in the current study were living in homes with at least one obese parent, and 69.9% had two parents who were obese. Further, 85.7% had fathers who were overweight or obese, and 71.6% had mothers who were overweight or obese.

Measures

Perceived Social Support

We assessed children's perceptions of parental support using the Parent Support Scale (Prochaska, Rodgers, & Sallis, 2002; Trost et al., 2003). We modified the scale to collect data on children's perceptions of maternal and paternal support for physical activity separately (i.e., five items with the mother as the provider, the same five items with the father as the provider), rather than for both parents combined. The tangible support scale included three items. Children reported the weekly frequency that their mother (or father) does "physical activity or play[s] sports with you," "watch[es] you do physical activity or play sports," and "take[s] you to a place where you can do physical activity or play sports." The intangible support scale included two items: Children reported the weekly frequency that their mother (or father) "encourage[s] you to be physically active or play sports" and "tell[s] you that physical activity and sports are good for you." We classified these items as tangible or intangible support based on previous work describing categorization schemes (Beets et al., 2010). Children responded to each item on a 4-point scale ranging from 1 (*rarely*) to 4 (*very often*). We summed the scores across items in both subscales and then divided the obtained scores by the number of items. Higher scores reflected the perception of more frequent support. The original scale has been used in more than 25 studies where scale reliability coefficients have been greater than .65 (see Sleddens et al., 2012). Moreover, scores on the original scale showed adequate internal ($\alpha > .77$) and test-retest (intraclass correlation coefficient $> .81$) reliability (Prochaska et al., 2002; Trost et al., 2003).

MVPA

We used ActiGraph LS 7164 accelerometers to assess children's MVPA levels. We instructed children to wear the accelerometer on their hip from the moment they woke up in the morning until they went to bed (excluding periods of bathing or other water activities) for a 7-day period following the clinic visit. We downloaded data in 1-min intervals and defined MVPA using Puyau, Adolph, Vohra, and Butte's (2002) criterion as $\geq 3,200$ counts \cdot minute $^{-1}$. Although several cutoff points are available to designate a threshold for MVPA in children, Puyau et al.'s cutoff point is more discriminant, and thus there is less risk for a Type I error than when data are classified using lower cutoff points. We calculated a total weekly MVPA score by summing the

number of minutes spent in MVPA after controlling for number of minutes the accelerometer was worn each day and the number of days on which it was worn. We excluded data from days when the accelerometer was worn for less than 80% of the average time worn on the other days (Catellier et al., 2005). The ActiGraph accelerometer has been used and validated in studies with children and adolescents (e.g., Jimmy, Dössegger, Seiler, & Mäder, 2012).

We obtained data on children's gender and age by self-report. A trained research assistant weighed participants to the nearest 0.1 kg and measured them to the nearest 0.1 cm. We calculated age- and gender-specific BMI z scores using the statistical analysis software program for the Centers for Disease Control and Prevention growth charts.

Data Analyses

We examined data for normality and outliers and computed descriptive statistics for each variable stratified by gender and weight status. For the main analyses, we conducted multivariate analysis of variance (MANOVA), paired-samples t tests, and multiple regression analyses. Specifically, we performed a 2 (gender) \times 2 (weight status) MANOVA with perceptions of maternal tangible support, paternal tangible support, maternal intangible support, and paternal intangible support as the dependent variables to examine gender and weight status differences (Objective 1). If the MANOVA was statistically significant, we would run univariate analyses of variance (ANOVAs) on each dependent variable to identify the source of significant differences, as well as effect sizes (i.e., partial eta squared [η^2]). Then, within each of the four groups (i.e., normal-weight girls, normal-weight boys, overweight girls, overweight boys), we performed four paired-samples t tests to compare mean perceptions of: (a) mother tangible versus mother intangible; (b) father tangible versus father intangible; (c) mother tangible versus father tangible; and (d) mother intangible versus father intangible (Objective 2). The first two analyses compared *type* of support, whereas the latter two compared *source* of support within each group. We calculated effect sizes (i.e., Cohen's d) for each comparison and made a Bonferroni adjustment to the statistical significance level to compensate for the multiple comparisons ($p = .05/16$ comparisons = .003). Last, we conducted multiple regression analyses to estimate the associations between perceptions of parental social support and MVPA behavior (Objective 3). We ran separate models for the maternal and paternal support variables to avoid spurious relationships resulting from multicollinearity and shared residual variance because the items assessing maternal and paternal support were worded similarly. Also, we performed these analyses stratified by gender and weight status, thus resulting in eight regression models (i.e., four groups and two sources of support). We made a

TABLE 1
Level of Social Support (by Source and Type) and Minutes of Moderate-to-Vigorous Physical Activity (MVPA) in Boys and Girls According to Weight Status

Variables	Boys Means (SD)		Girls Means (SD)	
	Normal-Weight (n = 178)	Overweight (n = 128)	Normal-Weight (n = 150)	Overweight (n = 102)
Maternal intangible support	2.80 (0.88)	3.13 (0.73)	2.94 (0.81)	3.05 (0.78)
Maternal tangible support	2.09 (0.64)	2.09 (0.70)	2.12 (0.65)	2.12 (0.63)
Paternal intangible support	2.80 (0.92)	2.97 (0.85)	2.74 (0.90)	2.91 (0.89)
Paternal tangible support	2.44 (0.79)	2.40 (0.90)	2.13 (0.78)	2.10 (0.68)
MVPA (min/week)	223.62 (131.07)	150.56 (99.74)	125.03 (88.26)	115.76 (58.74)

Note. Scale range for social support is 1 to 4.

Bonferroni adjustment to the statistical significance level for the regression analysis ($p = .05/8$ models = .006).¹

RESULTS

Descriptive statistics for all study variables stratified by gender and weight status are presented in Table 1. Participants reported moderate levels of perceived maternal and paternal support relative to the scale range. MVPA levels varied across groups, with normal-weight boys being the most active, followed by overweight boys, normal-weight girls, and overweight girls, respectively.

Perceptions of Social Support by Gender and Weight Status

Based on the MANOVA results, there were statistically significant main effects for gender ($F = 5.56, p < .001, \eta^2 = .04$) and weight status ($F = 2.13, p = .002, \eta^2 = .02$). The interaction effect for gender and weight status was not statistically significant ($F = 0.90, p = .46, \eta^2 = .01$). Based on the results from the follow-up ANOVAs, boys perceived more paternal tangible support compared with girls ($F = 11.95, p = .001, \eta^2 = .02$), and overweight children perceived more maternal intangible support compared with normal-weight children ($F = 6.17, p = .002, \eta^2 = .01$). No other statistically significant differences were observed when we compared perceptions of social support by gender and weight status.

Source and Type of Perceived Social Support

Based on the paired-samples t tests, there were statistically significant differences in levels of perceived social support across source and type in each of the four groups (see

Figures 1 and 2). For source, normal-weight and overweight boys perceived more paternal tangible support than maternal tangible support ($t_{\text{normal-weight boys}} = 6.12, p < .001, d = 0.47$; $t_{\text{overweight boys}} = 4.49, p < .001, d = 0.41$). Also, normal-weight girls perceived more maternal intangible support than paternal intangible support. No other statistically significant differences were detected when we compared perceptions of maternal and paternal support. For type, all children perceived more maternal intangible support than tangible support ($t_{\text{normal-weight boys}} = 11.73, p < .001, d = 0.90$; $t_{\text{overweight boys}} = 14.69, p < .001, d = 1.29$); $t_{\text{normal-weight girls}} = 12.23, p < .001, d = 1.01$; $t_{\text{overweight girls}} = 12.67, p < .001, d = 1.27$) and more paternal intangible support than tangible support ($t_{\text{normal-weight boys}} = 5.41, p < .001, d = 0.41$; $t_{\text{overweight boys}} = 7.65, p < .001, d = 0.68$; $t_{\text{normal-weight girls}} = 8.94, p < .001, d = 0.74$; $t_{\text{overweight girls}} = 10.14, p < .001, d = 1.04$).

Associations Between Perceptions of Social Support and MVPA Behavior

The results for the multiple regression analyses are shown in Table 2. Only the model for normal-weight girls including paternal social support variables was statistically significant ($F = 4.56, p = .001$), wherein perceptions of paternal tangible support were statistically significantly associated with MVPA behavior ($\beta = .28, p = .003$). However, only a small amount of variance in MVPA was explained ($R^2 = .06$). No other statistically significant associations were observed.

DISCUSSION

MVPA is important in preventing weight gain in children (Hills et al., 2010), yet previous reports indicate that only 9% of Canadian children and adolescents attain the recommended amount of MVPA (Colley et al., 2011). Increasing parental support may be one strategy to increase

¹Variables for maternal and paternal weight status were tested as covariates in the analyses. Because these inclusions did not alter the model estimates, the unadjusted models are presented.

children’s physical activity levels (Trost et al., 2003). Therefore, the purpose of our study was to examine children’s perceptions of parental support and to estimate the associations between these perceptions and MVPA behavior. Considering that children living with overweight or obese parents are at increased risk for weight problems (Svensson et al., 2010) and thus are an important public health target sample, our study focused on this subpopulation of children at higher risk for becoming overweight or obese. Our specific objectives were: (a) to determine if children’s perceptions of maternal and paternal tangible and intangible support differ by children’s weight status and gender; (b) to compare perceptions of maternal and paternal levels of support, as well as tangible and

intangible levels of support in normal-weight boys, normal-weight girls, overweight boys, and overweight girls; and (c) to examine the associations between children’s perceptions of maternal and paternal tangible and intangible support and MVPA behavior. Overall, perceptions of parental support differed slightly by gender and weight status, such that boys reported more paternal than maternal tangible support, and overweight children perceived more maternal intangible support compared with normal-weight children. Further, levels of perceived social support were statistically significantly different across source and type in each of the four groups. Finally, perceptions of paternal tangible support were positively associated with MVPA behavior, but only in normal-weight girls.

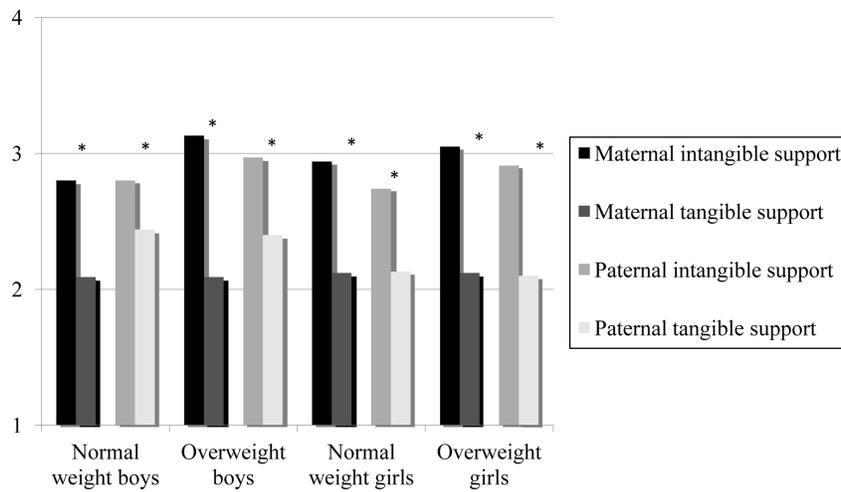


FIGURE 1 Comparison between perceived intangible and tangible social support for physical activity in normal-weight boys, normal-weight girls, overweight boys, and overweight girls—Study Objective 1. *Statistically significant differences at $p < .003$ after Bonferroni adjustment.

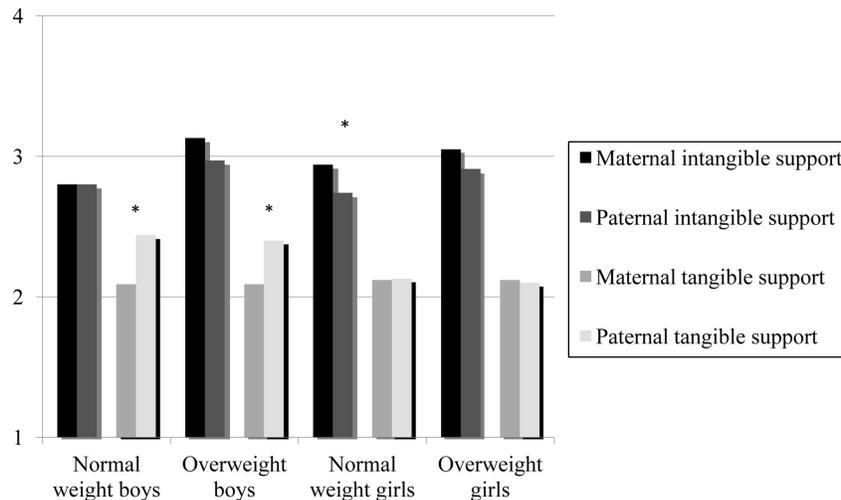


FIGURE 2 Comparison between perceived maternal and paternal social support in normal-weight boys, normal-weight girls, overweight boys, and overweight girls—Study Objective 2. *Statistically significant differences at $p < .003$ after Bonferroni adjustment.

TABLE 2
Associations Between Perceptions of Social Support and Minutes of Moderate-to-Vigorous Physical Activity (MVPA)
Stratified by Gender and Weight Status

Variables	Boys				Girls			
	Normal-Weight		Overweight		Normal-Weight		Overweight	
	R^2	β	R^2	β	R^2	β	R^2	β
Model 1: Maternal	.01		.02		.04		.01	
Intangible support		-.01		-.07		.04		.10
Tangible support		.08		.15		.19		-.08
Model 2: Paternal	.02		.01		.06*		.04	
Intangible support		.02		-.09		-.10		-.21
Tangible support		.12		.10		.28**		.20

*Statistically significant associations at $p < .006$ after Bonferroni adjustment. ** $p < .001$.

Perceptions of Social Support by Weight Status

In our study, 41% of children were overweight and those children perceived slightly more maternal intangible support than did their normal-weight counterparts. This finding is contrary to previous research reporting that normal-weight children perceived higher levels of social support for physical activity compared with overweight children (Zabinski et al., 2003). A possible explanation for this difference that warrants further investigation is that in our study, mothers may have been aware of their overweight child's low physical activity levels and may have been keenly aware of obesity-related issues, and thus were more inclined to provide support for physical activity. That is, mothers of overweight children may have felt their overweight child was insufficiently active and thus sought to increase their child's physical activity levels by providing more support for physical activity. In contrast, mothers of normal-weight children may not have seen a need to encourage their child to be active because parents of normal-weight children tend to overestimate their child's physical activity levels (Corder et al., 2010).

Perceptions of Social Support Differ Across Source and Type

Overall, our results suggest that children perceived more intangible than tangible support from their parents. Moreover, the results suggest that children's perceptions of which parent provided more support for physical activity varied based on the type of support. Boys perceived more paternal than maternal tangible support, which is consistent with previous research showing that fathers are more engaged in physical activity with their children (i.e., a form of tangible support) compared with mothers (Moore et al., 1991). In contrast, normal-weight girls perceived more maternal than paternal intangible support. These differences, most of which were of medium to large magnitude based on Cohen's d , could reflect general parenting practices. Parke

(1995) showed that fathers have a more playful approach to parenting, while mothers have a more nurturing approach. The "match" between children and their parents in terms of gender may also explain the divergent findings. It is possible that boys identified more with their fathers and girls identified more with their mothers, which might have enabled them to perceive more social support for physical activity from the same-gendered parent. Research is needed to examine if general parental strategies, parental role division related to physical activity, and gender "matching" influence children's perceptions of maternal and paternal support.

Associations Between Perceptions of Social Support and MVPA

Consistent with previous research (Beets et al., 2010; Pugliese & Tinsley, 2007), perceptions of paternal tangible support were statistically significantly associated with MVPA behavior in normal-weight girls, but the observed proportion of variance explained was rather low ($R^2 = .06$) in our study. Although this may reflect the very small impact of social support on MVPA in families with at least one obese parent, this effect size should be considered within study parameters (Olejnik & Algina, 2000). First, its magnitude could relate to the method we used to assess physical activity (i.e., accelerometers) because associations between perceived social support and physical activity levels are typically weaker when using monitoring devices rather than self-report methods (Pugliese & Tinsley, 2007). Accelerometers capture both voluntary and nonvoluntary aspects of physical activity such as incidental bouts of movement that are likely not influenced by parental support. Relatedly, we focused on MVPA because guidelines recommend that children engage in physical activity at these intensities (Colley et al., 2011). Second, our use of a self-report questionnaire to assess children's perceptions of social support possibly introduced measurement error, resulting in increased error variance and decreasing the proportion of variance that could be explained. Third, the

distributions of the social support scores were relatively small, which typically leads to smaller effect sizes. Fourth, the “causal” connection between perceptions of social support and MVPA is probably mediated by other variables, in which case perceptions of social support could still exert a considerable influence on MVPA albeit via multiple unmeasured pathways. These issues should be considered in future studies examining the association between perceptions of paternal tangible support and MVPA behavior in normal-weight girls.

Perceptions of maternal and paternal intangible support were not related to MVPA behavior. Intangible support may have had less influence on physical activity behavior because it did not eliminate key barriers to physical activity in these 8- to 10-year-old children (e.g., transportation to/from activity locations; Trost et al., 2003). Alternatively, perceived intangible social support may relate indirectly to MVPA. Indeed, indirect associations between perceived social support and physical activity through mediating variables such as self-efficacy and enjoyment have been reported (Sabiston & Crocker, 2008; Trost et al., 2003). Encouraging children to participate in physical activity and teaching them that being physically active is good for them (i.e., intangible support) might increase self-efficacy, motivation, and positive attitudes toward physical activity, which in turn influences behavior. Researchers could draw on existing psychosocial theories and models (see Sabiston & Crocker, 2008; Trost et al., 2003, for examples) in future studies to test possible mediating variables that link perceived social support and physical activity behavior.

Our findings suggest that perceived parental support is not related to MVPA behavior in overweight children. Similarly, Trost et al. (2001) showed that support from family and peers is positively related to physical activity behavior in normal-weight children, but not in their overweight peers. Overweight children are often stigmatized and evaluated more negatively (e.g., lazy, ugly, unlikeable) compared with normal-weight children (Puhl, 2011). They may feel embarrassed and/or uncomfortable in exercise-related situations and may avoid these situations to prevent further stigmatization (Vartanian & Novak, 2011; Zabinski et al., 2003). Thus, despite parents' attempts to facilitate physical activity behavior, overweight children who fear weight stigma and prejudice might avoid physical activity (Vartanian & Novak, 2011).

Finally, our results suggest that parents might not be the primary source of support for MVPA in boys because perceptions of maternal and paternal support, regardless of type, were not related to MVPA behavior in boys. Gender socialization might help explain these findings. School-based physical activities such as physical education and intramurals may benefit boys because competitiveness and motor mastery are frequently promoted (Garrett, 2004). Further, many of the physical activities taught to children are sports that embrace masculine attributes (e.g., power, strength, competition; Theberge, 2000). For these reasons,

boys might inherently perceive multiple opportunities to be physically active. Accordingly, parental support may be less influential for them because they are already well integrated into these activities and have the opportunity to receive support from nonparental sources (Garrett, 2004).

Study Limitations and Strengths

Limitations of our study include that the sample was composed of children at higher risk for becoming overweight or obese because of their parents' weight status (Svensson et al., 2010). Our requirement that children have at least one biological parent with overall or abdominal obesity could therefore limit the generalizability of the findings because the family environment for these children might differ from that of children living with two normal-weight parents. Further limiting the generalizability of the findings is that our sample consists of Caucasian children residing in Canada. In addition, causality cannot be inferred because our study was based on cross-sectional data. Last, the order of inquiry for the source of support on the social support scale was the same for all participants (i.e., maternal items were presented first), which may have introduced bias.

Despite these limitations, our investigation builds on previous findings by assessing physical activity behavior using accelerometers and by measuring children's perceptions of maternal and paternal support separately. Moreover, we investigated two types of support (i.e., tangible, intangible) rather than using a single index of the amount of support for physical activity. However, the relationships between these types of maternal and paternal support and physical activity we observed were of weak magnitude or not statistically significant, which raises the question of whether there are unique familial aspects about the higher-risk sample studied. For example, Gorin, Phelan, Raynor, and Wing (2011) showed that the homes of overweight and obese individuals had less exercise equipment than did homes of normal-weight individuals. From this perspective, the social influence of parents on children's physical activity behavior may not be powerful enough to influence children's behavior if they are living in environments that encourage physical inactivity (e.g., lack of equipment around the home that offer opportunities to be active). Given that all children in our study had at least one obese parent and that 69.9% had two obese parents, further investigation into the home physical activity environment is needed to better understand if household factors explain the lack of associations between parental support and physical activity in higher-risk groups.

Implications for Future Research

The findings from our study emphasize the need to distinguish between maternal and paternal sources of support, as well as tangible and intangible types of support.

In addition, they highlight the need to conduct analyses stratified by children's weight status and gender. Considering that mothers and fathers played a modest role in influencing their child's MVPA behavior in our study, other sources of support (e.g., peers, siblings, teachers) and mediating variables (e.g., self-efficacy, enjoyment) should be investigated in this age group (i.e., 8–10 years old). Other forms of social influences such as quantity and quality of social networks and social norms also warrant further investigation. In a similar vein, future research should consider the interplay between these factors and social control tactics (Wilson & Spink, 2011).

WHAT DOES THIS ARTICLE ADD?

Researchers argue that physical activity is influenced by social, physical, and psychological factors. Our findings provide novel insights into the nature of perceived parental social support and the relationship to MVPA behavior in children at higher risk for becoming overweight because of their parents' obese weight status. Specifically, our findings suggest that perceiving social support for physical activity from one's parents does not necessarily lead to action. Accordingly, more research is needed to identify mechanisms through which perceptions of parental support lead to physical activity behavior to identify targets for intervention. In addition, when studying the influence of perceived parental support on physical activity behavior in children, it is necessary to recognize that mothers and fathers provide different levels and kinds of support for their children. Thus, care must be taken in future research to differentiate between the source (i.e., mothers, fathers) and type (i.e., tangible, intangible) of social support. Finally, more knowledge is needed on how to effectively intervene in different subgroups of children because diverse findings emerged for normal-weight and overweight girls and boys.

ACKNOWLEDGMENTS

A special thank you goes to Dr. Marie Lambert, our friend and colleague and the principal investigator of the QUALITY study, who passed away on February 20, 2012.

FUNDING

This study was funded by the Canadian Institutes for Health Research, Heart and Stroke Foundation of Canada, and Fonds de la Recherche en Santé du Québec.

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