CHILDHOOD OBESITY
December 2012 | Volume 8, Number 6

DOI: 10.1089/chi.2012.0029

ORIGINAL ARTICLE

The Role of Motivation in Understanding Social Contextual Influences on Physical Activity in Underserved Adolescents in the ACT Trial: A Cross-Sectional Study

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Abstract

Background: Previous research has shown that social contextual factors are important in understanding physical activity (PA) behavior, although little is known about how these factors may relate to PA, especially in underserved adolescents (low income, minorities). This study examined how motivation may differentially mediate the relationship of two social contextual variables (*i.e.*, peer and parent social support) and moderate-to-vigorous PA (MVPA).

Methods: Baseline data (n = 1421 sixth graders, 54% female, 72% African American) from the Active by Choice Today (ACT) trial in underserved adolescents were analyzed. Motivation was examined as a mediator of the relationships between peer social support, parent social support, and MVPA (measured by 7-day accelerometer estimates).

Results: Motivation and peer but not parent support were significantly related to MVPA overall. Significant mediation effects were found indicating motivation partially mediated the relation between peer social support and MVPA and to a lesser degree parent support and MVPA.

Conclusions: These findings provide support for the importance of social contextual influences, especially peer social support, on underserved adolescents' PA and motivation for PA.

Introduction

The decline of physical activity (PA) is a key factor involved in the obesity epidemic. Despite abundant evidence of the physical, social, and mental health benefits of engaging in regular PA, a rapid decline of PA levels occurs during adolescence.[1] Some estimates show fewer than 10% of adolescents are meeting the recommendation to engage in at least 60 minutes of PA a day.[2] Furthermore, underserved adolescents (low income, minorities) are typically less physically active, have lower enrollment in team sports, and have poorer access to PA facilities than their higher-income and nonminority peers.[3–5]

An ecological perspective has been useful in conceptualizing influences on health behaviors at multiple levels (individual, social, and environmental).[6] As such, social context, including social support, has been frequently investigated as it relates to PA.[7–11] Social support generally refers to any aid an individual receives for a behavior though many definitions, sources, and types exist.[12] Social relationships with parents and peers are key factors of the social context and are important potential sources for support and approval that an adolescent may receive in being physically active. The balance of peer and parent support is particularly important to consider due to the developmental relevance of changing relationships and PA decline during adolescence and has been a topic of considerable debate.[13] In one longitudinal study of girls' aged 9–15 years that compared peer and parent support, parental modeling and logistical support (*e.g.*, providing transportation, enrolling girls in sports) decreased with age and were higher for girls who were able to maintain PA. General peer support for PA increased over time for girls who maintained PA as well as those that did not maintain PA. The authors speculated peer social support was co-dependent with parent logistical support (*e.g.*, peer support

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contingent on receiving logistical support), thus explaining the null finding, but also cited concerns with low internal consistency of the peer support measure.[8]

Overall, this study showed the importance of investigating multiple social influences on adolescents and suggests support from parents and peers may be affecting youth PA through different mechanisms.[8] Studies on general peer social support (*i.e.*, including emotional, modeling, etc.) have supported a positive relationship with PA cross-sectionally[12,14] as well as over time[7,8] and in intervention settings,[15] although some studies have not demonstrated a consistent relationship between peer social support and PA.[8,16,17] Research on all forms of parent social support has shown mixed results, with some studies supporting positive relations and others showing no or mixed relations.[18] A recent review on parental social support and PA in underserved adolescents was unable to draw conclusions regarding these relations, citing potential differences in the amount, types, sources, and measures of social support as well as potentially unaccounted for moderators (*e.g.*, sex)[19] that have been highlighted in other studies.[8,16,17] Although social context has been shown to be important, little research exists to characterize adolescents' social context, including how parents versus peers contribute to understanding the relationship with youth engagement in PA.

Increasingly, the focus of the field is on a mediating a variable framework in which determinants of PA can be tested as specific mechanisms for understanding how, or why, they are related to PA.[20,21] In the current study, motivational theories[22–24] provided a general framework for understanding the influences on PA and direction of relations. According to Self-Determination Theory (SDT), motivation (*i.e.*, the aspects of activation and intention for behavior) is qualified on a continuum according to the extent its regulation is autonomous (*i.e.*, more internal) versus controlled (*i.e.*, more external).[22] Within SDT, the social context is emphasized as the key source in determining the quality of motivation.[22,25] In addition, other motivational theories support the examination of social contextual effects on motivation.[23,24] Social contextual referencing, such as how one presents oneself to others[23] or how social cues may work to create dissonance,[24] seem to be important factors in creating goal-directed behavior. Evidence is building, including prospective studies[26] and experimental manipulations of the social context,[27] to support the direction of social context affecting motivation, which in turn is posited to affect behavior.[28–32] Further investigation of the role of social context in motivation and health behaviors, such as PA, is relevant to inform more effective obesity prevention and intervention efforts.

Research on motivation has shown it to significantly predict leisure-time exercise and PA[29,30] and the transfer of behavior across contexts (*i.e.*, physical education motivation predicting leisure-time PA).[28] Some studies have examined motivation as it relates to characterizing social context and PA relations. Previous research has supported the role of motivation in understanding social contextual variables and PA in a physical education setting,[31,32] primarily in sports[9] and predominately Caucasian samples.[9,29,33] A study by Ullrich-French and colleagues[34] emphasized examining multiple social relationships (parents and peers) and combinations of social relationships in predominantly Caucasian adolescents in a sport context, which is likely different than total PA. Additionally, motivation but not health behavior was examined as an outcome.[34] Identification of potential mediators, or mechanisms, through which social support influences PA behavior in addition to motivation may help to clarify the mixed results from previous social support and motivation literature and provide a target for future intervention development. Research has also supported the use of intrapersonal variables as mediators of social context and PA relations in general populations.[31,32] Only one previous study has been conducted that examined social context and motivation in a sample at high risk for chronic disease development. This study of predominately Hispanic adolescents supported the association of teacher and parent social context on pedometer-assessed PA via increasing motivation.[30] However, the study did not examine peer social support influences and did not find a mediated effect using a causal steps mediation approach. More research is needed to demonstrate these relations in underserved youth who have been shown to receive less social support for PA than Caucasian youth from both family and peers, for which interventions are less effective, and who show lower rates of sport participation.[5,12,35,36]

The present study expands on previous research by more closely examining peer social support, parent social support, and motivation using general accelerometer-measured MVPA in underserved boys and girls. The purpose of the present study was to examine motivation as a mediator of the relation between peer and parent social support and moderate-to-vigorous PA (MVPA) in underserved youth. A second purpose was to explore the total and direct effects of parent versus peer social support and MVPA.

Methods

Participants

Participants (n = 1421, boys = 650, girls = 771) were part of a group randomized controlled trial examining a motivational plus behavioral skills intervention on increasing PA in underserved adolescents "Active by Choice Today" (ACT) trial.[37] Schools were eligible to be considered for the ACT intervention if at least 50% of students were minorities and/or on free and reduced lunch status. Students were eligible to participate if they were: (1) Currently enrolled in the 6th grade, (2) obtained parental consent to participate, and (3) agreed to participate. Students were ineligible if they: (1) Had a medical condition that prevented participation in MVPA, (2) were developmentally delayed, or (3) were currently in treatment for a psychiatric disorder. Approximately 3000 adolescents within 24 schools (4 cohorts of 6 schools)

throughout South Carolina were targeted for recruitment on a volunteer basis to participate. All parents/guardians and adolescent participants completed an Institutional Review Board approved parental consent form and assent form, respectively. Cross-sectional baseline data from the entire ACT trial were used in the current study.

Procedure

A detailed description of and results from the ACT trial have been previously published.[37–39] After recruitment and before randomization to treatment condition, an independent trained measurement team collected baseline measures for all students. Baseline measures, administered in classrooms, included demographic and psychosocial surveys, objectively measured height, weight, and waist circumference, and 7-day accelerometer estimates of PA collected by the measurement team. Survey measures were modified for a 3rd-grade reading level and through expert input from international consultants. Specifically, all measure response options were modified to be answered on a three-point scale ranging from 1 = Not like me, 2 = A little like me, to 3 = A lot like me. This was done to increase the likelihood that youth would be able to meaningfully discriminate between response options.

Measures

Motivation for PA. Motivation for PA was measured using an already modified scale by Wilson and colleagues.[40,41] Participants responded to eight items that were standardized and averaged to create a measure of motivation (*e.g*., "I am excited about being active on most days," "Being active is important to me," "I plan how I can be active everyday," "I get into being active on most days"). This motivation measure captures one's willingness and desire to be active on a daily basis and to incorporate it into one's routine activities. That is, this measure more broadly reflects autonomous motivation by capturing aspects of a more internalized behavioral regulation. It is unlikely that adolescents who are externally regulated would endorse high levels of these items and also that they would engage in these activities "every day" or on "most days" because externally regulated behaviors are less likely to be sustained over time. Correlations with enjoyment ($r = 0.70$), an additional autonomous motivation measure ($r = 0.63$), and with self-efficacy ($r = 0.60$) provide support for these theoretical postulations. Previous studies in African-American youth have shown this scale to have acceptable reliability (α range from 0.78 to 0.90[41,42]). Internal consistency was supported in the current study ($\alpha = 0.88$). Support for construct validity has been shown in a previous study using this scale in which PA motivation was predictive of MVPA.[42]

Peer and parent social support. Peer and parent social support was measured using modified versions of the Support for Exercise Scales developed by Sallis and colleagues.[43] Participants responded to 12 items (six items for parents and six for peers) such as, "In the past month, how often has a friend been active with you?" and "In the past month, how often has a friend reminded you to be active?" Items predominantly asked about emotional support, and two asked about parents and peers engaging in activity with the adolescent. The six items were standardized and averaged to create measures of peer and parent social support. These scales have demonstrated moderate-to-good test–retest reliability ($r = 0.79$) and internal consistency ($\alpha = 0.84$[43]). Construct validity is supported in that previous studies have shown this scale to be predictive of child and adolescent PA, including African-American youth.[44–46] Internal consistency was supported in the current study ($\alpha = 0.80$ for both scales).

Physical activity measure (accelerometers). PA estimates were obtained using the Actical omnidirectional accelerometers (Mini-Mitter, Bend, OR). Actical has demonstrated moderate-to-high correlations between activity counts and energy expenditure of youth measured concurrently by other empirically tested accelerometers (*e.g*., MTI Actigraph, Caltrac, Tritrac) in previous studies.[47] Participants wore an accelerometer over 7 consecutive days to calculate MVPA at baseline. Each day of Actical data was divided into five intervals: 6–9 a.m., 9 a.m.–2 p.m., 2–5 p.m., 5–8 p.m., and 8 p.m. to midnight, to facilitate examination of PA by specific time periods throughout the day as was done in a previous national trial.[48] Data were recorded in 1-minute epochs,[49] 20 minutes of consecutive zeros were used to define nonwear, and raw activity data were converted into time spent in moderate PA [3 to <6 metabolic equivalents (METS)], MVPA (3 to <9 METS), and vigorous PA (6 to <9 METS) based on Actical-specific activity count thresholds for children (where MVPA = 1500 to ≥6500 and VPA ≥6,500) identified by Puyau and colleagues.[47] Following a previous national multisite trial's procedures, a student's data were considered missing for a given time period if they wore the accelerometer less than 80% of the time that 70% of the students wore their accelerometers.[48] Following data imputation, the minutes of PA for each time interval were summed for each day, and the seven daily estimates of PA were averaged to provide one average daily measure of minutes of MVPA.

Data Analysis

Bivariate and logistic regressions (to adjust standard errors for multiple imputation) using sex as the predictor of individuals' characteristics were used to test for sample differences across sex. To assess for indirect effects, variate multiple regressions were run that included both peer and parent social support, and separate mediated effects were calculated for each as described below. Regression analyses were conducted in accordance with the product as coefficients approach[50] as follows: (1) Motivation was regressed on peer and parent social support (*i.e*., mediator regressed on independent variable (IV)) and (2) MVPA was regressed on peer and parent social support and motivation (*i.e*., dependent variable (DV) regressed on

mediator and IV). MVPA was regressed on peer and parent social support (*i.e.*, DV regressed on IV) to examine total effects. Regression parameters were analyzed to determine if the effect of the independent variable was attenuated after accounting for the mediator. Covariates for all models included sex and BMI. The estimate of the mediated effect was obtained by multiplying two coefficients: a (one of the respective social support parameters from regression 1 above) and b (the motivation parameter from regression 2 above). To test for significance of the mediated effect, standard errors were calculated using the first order method,[51] and *t*-tests were used to evaluate the null hypothesis that the effect was not different from zero using the formula *t*-value = $ab / \sqrt{(b^2 s_a^2 + a^2 s_b^2)}$, where a is one of the social support coefficients predicting motivation, b is the motivation coefficient predicting PA holding social support constant, s_a is the standard error of a, and s_b is the standard error of b. Approximate estimates of the F statistics and R^2 values were obtained by averaging the values across imputations for each model.

Missing data were dealt with using multiple imputation (with $m = 40$ imputations) to provide unbiased parameter estimates and standard errors as proposed in a previous national trial.[48] Multiple imputation procedures were conducted in the R statistics program using the PAN package to model multilevel imputations under a normal distribution (multiple imputation procedures are described in much greater detail in reference[52]). Fractions of missing information are reported for each parameter and were relatively low, ranging from 0.01 to 0.26. Less than 3% of participants were completely missing PA data, approximately 36% of participants had some missing PA data due to noncompliance (*i.e.*, missing at least one interval during the 1-week wear period), and less than 1% were missing any psychosocial data.

The current study focused on individual level data, and while the data contain a nested structure (students clustered within schools), intraclass correlation coefficients for the outcome variables were low (between 0.01 and 0.02). Individual level design effects (the multiplier by which standard errors are increased due to clustering) were calculated using the formula from Neuhaus and Segal [53] and ranged between 1.006 and 1.012 for this study, supporting the use of individual level analyses. The original sample size was 1422. One outlier with an extreme value on MVPA was excluded from the analyses resulting in a final sample size of 1421. All analyses were conducted in the R statistics program, v. 2.10.

Results

Participant Characteristics

Demographic and baseline characteristics by sex are presented in Table 1. Boys showed significantly higher levels of MVPA, peer social support, and motivation, were significantly older, and had significantly lower BMI values and lower parent social support as compared to girls ($p < 0.05$ for all; degrees of freedom are capped at maximum for sample size of 1420 based on imputation estimates). Effect sizes (computed as standardized differences) for differences by sex were generally small (Cohen $d < 0.25$[54]), with the exception of MVPA (Cohen $d = 0.66$). Approximately 51% of the sample had BMI values (adjusted for age and sex) at or above the 85th percentile, and 33% were at or above the 95th percentile. Only 19.7% were meeting recommendations to engage in 60 minutes of MVPA per day. Approximately 71% of the sample was on free and reduced lunch status and 73% were minorities (see Table 1), indicating recruitment efforts were successful in capturing an underserved adolescent population.

Correlation Analyses

Correlation analyses were performed to examine the relationships between motivation, peer social support, parent social support, MVPA, and BMI (see Table 2). MVPA was significantly correlated ($p < 0.05$ for all) with all the primary variables of interest in the expected directions. Peer social support, parent social support, and motivation were also significantly correlated in the expected direction. BMI was significantly related to parent but not peer support.

Mediation Analysis

Results of the mediation analysis are shown in Table 3 and indicated a significant mediation effect for peer support and, to a lesser degree, parent support. Significant associations between peer and parent support on motivation were found. Motivation was significantly related to

Table 1. Demographic, Baseline, and Psychosocial Characteristics by Sex

Characteristic	Boys	Girls	Total
Sample size, *n* (%)	650 (45.74)	771 (54.26)	1421
African American, *n* (%)	474 (72.92)	567 (73.54)	1041 (72.9)
Age (years)**	11.43 (0.64)	11.27 (0.53)	11.34 (0.59)
Free/reduced cost lunch, *n* (%)	452 (69.54)	563 (73.02)	1015 (71.43)
BMI (kg/m^2)**	22.23 (5.91)	23.29 (6.09)	22.80 (6.03)
BMI percentile[a]	73.04 (28.15)	76.13 (25.98)	74.71 (27.03)
Waist circumference (cm)	70.75 (12.49)	71.20 (12.32)	71.01 (12.38)
MVPA[b] (minutes/day)**	51.49 (30.28)	34.45 (20.55)	42.81 (26.67)
Motivation**	2.39 (0.51)	2.28 (0.50)	2.33 (0.51)
Peer social support*	1.95 (0.53)	1.89 (0.53)	1.92 (0.53)
Parent social support*	1.87 (0.53)	1.92 (0.51)	1.90 (0.52)

Values are expressed as means (standard deviations) unless otherwise noted.

*$p < 0.05$; **$p < 0.01$.

[a]BMI adjusted for sex and age.

[b]Moderate to vigorous physical activity.

PA controlling for the effect of covariates, peer support, and parent support. Additionally, peer support, but not parent support, showed a significant overall relation to PA (total effect). When PA was regressed on peer and parent social support accounting for motivation and covariates, the effect of peer social support on PA was still significant but was reduced. The effect of parent social support on PA remained nonsignificant and was also reduced. To determine whether these reductions were significant, standard errors for the mediated effects were calculated based on the first-order test (*i.e.*, the Sobel test[51]). The total mediated effect resulted in significant reductions in the effect of peer social support on minutes of PA (B = 3.69 to B = 1.99) and to a lesser degree parent support (B = 0.67 to B = 0.004). Standard errors should be interpreted with caution given asymmetrical confidence intervals were not calculated due to the use of multilevel multiple imputation. Secondary mediation analyses (results not shown) stratified by weight status [normal weight (<85 percentile BMI) and overweight (>85 percentile BMI)] were conducted and showed no differences in mediation by weight status or in the overall mediation patterns.

Table 2. Correlations between Psychosocial Variables, BMI, and MVPA (*n* = 1421)

Variable	MVPA	BMI	Motivation	Peer Support	Parent Support
MVPA[a]	—	–0.16**	0.16**	0.14**	0.05*
BMI[b]		—	–0.01	0.01	0.09*
Motivation			—	0.49**	0.37*
Peer Support				—	0.55**

**$p < 0.01$; *$p < 0.05$.

[a]Moderate-to-vigorous physical activity (minutes/day).

[b]Unadjusted body mass index.

Discussion

The purpose of this study was to examine and compare motivation as a mediator in the relationship between peer

Table 3. Summary of Mediation Analysis and the First-Order Test of Significance for Motivation as a Mediator in the Social Support–Physical Activity Relationship (*N* = 1421)

Variable	B	SE	β	df	t	Lower CI	Upper CI	FMI
Social support predicting motivation ($F(4, 1416) = 125.72$, $p < 0.01$), $R^2 = 0.26$								
Intercept	0.07	0.03	0.00	1417	2.95*	0.02	0.12	0.01
Female	–0.14	0.03	–.07	1417	–3.98**	–0.20	–0.07	0.01
BMI	–0.003	0.003	–.02	1417	–0.90	–0.008	0.003	0.01
Peer support	0.42	0.03	0.29	1417	14.35**	0.36	0.48	0.01
Parent support	0.16	0.03	0.12	1417	5.61**	0.11	0.22	0.01
Social support and motivation predicting MVPA ($F(5, 1415) = 46.96$, $p < 0.01$), $R^2 = 0.14$								
Intercept	51.37	1.16	0.00	594	44.20**	49.09	53.65	0.26
Female	–14.70	1.47	–.27	1416	-10.02**	–17.58	–11.82	0.13
BMI	–0.82	0.12	–.18	1416	–6.68**	–1.06	–0.58	0.15
Motivation	4.05	1.18	0.15	1085	3.45*	1.75	6.36	0.19
Peer support	1.99	1.32	0.05	1416	1.51*	–0.59	4.58	0.12
Parent support	0.004	1.26	0.001	1416	0.004	–2.47	2.48	0.15
Social support predicting MVPA ($F(4, 1416) = 54.43$, $p < 0.01$), $R^2 = 0.13$								
Intercept	51.67	1.16	0.00	609	44.47**	49.39	54.95	0.26
Female	–15.25	1.46	–.28	1418	-10.43**	–18.12	–12.38	0.12
BMI	–0.83	0.12	–.18	1418	–6.74**	–1.07	–0.59	0.15
Peer support	3.69	1.24	0.09	1418	2.97**	1.25	6.13	0.13
Parent support	0.67	1.26	0.02	1418	0.53	–1.80	3.13	15
Mediated effects								
αβ (Peers)	1.70	0.51	.04	1176	3.35**	0.70	2.69	0.18
αβ (Parents)	0.66	0.02	.22	1176	2.95**	0.22	1.09	0.13

Based on imputation estimates, degrees of freedom are capped at maximum for sample size or adjusted downward based on FMI. F and R^2 estimates are inflated because they do not account for between imputation variation.

*$p < 0.05$; **$p < 0.01$.

SE, Standard error; CI, confidence interval; df, degrees of freedom; FMI, fraction of missing information; BMI, unadjusted body mass index.

versus parent social support and accelerometer-measured MVPA in underserved adolescents. Motivation served to partially mediate the relation between peer social support and MVPA as hypothesized and to a lesser degree parent social support and MVPA. After accounting for the indirect associations of both social contextual measures on PA through motivation, the direct associations of peer social support and parent social support were attenuated. Although the effect sizes were limited, particularly with parent support (*i.e.*, about 1.7 and 0.66 minutes, respectively), and causal conclusions cannot be drawn, results of the current study emphasize the importance of understanding how social contextual factors such as peer and parent social support may influence motivation and PA.

Results of the current study support the examination of mediation in social contextual, motivation, and PA relations. Future research should examine how other factors also characterize peer and parent influences, such as the quality of the relationships[55] or the combination of the relationships.[33] Other moderators or important variables, such as weight status or sex, may also be important to consider.[46] Some research exists that explores how characteristics of peer relations are associated with autonomous motivation for sport and has shown that more adaptive peer relationships (*i.e.*, higher acceptance, lower conflict, and positive friendship quality) were associated with more autonomous motivation for sport. Future research may seek to disentangle the effects of social context and its most salient features through investigating types, characteristics, and combinations of different measures of social context and potential differences in mechanisms.[18,33]

Results of the study may indicate that other variables are also needed to characterize how parent and peer social support affects MVPA. For example, it may be that social context influences both motivation and other intrapersonal variables, such as self-efficacy. Motivation accounted for almost half of the overall relationship between peer social support and MVPA while it accounted for almost all of the relationship between parent social support and MVPA supporting the potential for multiple pathways. Additionally, small effect sizes and differences in mediation effects across parents versus peers suggest future research may be able to identify additional potential mechanisms at work. Although a statistically significant mediation effect was found for parent support, the clinical significance of a 0.66-minute effect is limited. Longitudinal research in underserved girls found peer support levels increased over time compared to decreasing parent support levels, but only parent support significantly differentiated the girls' maintenance of PA.[8] Results expand on this work by demonstrating a significant association of peer support with MVPA and by suggesting motivation as a potential mechanism for the associations between social context on PA in both girls and boys who were underserved.

The current study found a significant association of peer social support with PA, which remained even after accounting for the indirect association of motivation, but no total effect of parent support. Mixed results regarding associations of different forms of social support are common in the social support and PA literature[12,14,15,18] and appear to be, in part, due to difficulty characterizing the different types, sources, and measures of social support. Stronger associations of peer social support compared to parent social support may also be related to developmental changes in adolescents[13] and increasing levels of peer versus parent support as adolescents age.[8]

The current study supports further investigation into motivation as a potentially important intrapersonal variable for investigating multiple systems. Results suggest mediation as a potential mechanism for integrating systems whereby broader level systems are tested as operating on more central and intrapersonal systems, including motivation, to change behavior both directly and indirectly. Psychological needs fulfillment from a SDT perspective may lend some insight into potential mechanisms at play. To understand how motivation comes to be qualified as autonomous versus controlled within SDT, social context is emphasized and either facilitates or undermines one's natural inclination toward autonomous motivation via effects on key psychological needs including autonomy, relatedness, and competence. Different social relationships may be instrumental for fulfilling different psychological needs. For example, it could be that parent support is more likely to meet needs of autonomy whereas peers facilitate feelings of relatedness. Although the study is limited in that a specific test of SDT was not possible, the importance of the effects of the social context on motivation and PA behavior and the potential mechanisms involved are consistent with SDT.

The current study's measures may capture aspects of autonomous motivation and autonomous social support, and future work should explore these relations with measures more closely aligned with SDT. Another motivational theory–based PA intervention technique,[23] strategic self-presentation, emphasizes the role of creating cognitive dissonance or inconsistency between how one presents oneself in a social contextual setting and subsequent motivation to fulfill that presentation.[41] From this perspective, the current study's results may be reflecting how parent and peer support differ in their effects on PA through changes in how the adolescent presents her/himself to parents versus peers. Determining how social context influences intrapersonal variables as well as PA directly could inform more efficient intervention approaches. The current study replicates the general mediation relations and the importance of motivation shown by Vierling and colleagues[30] in Hispanic youth. It expands on those results through examining a predominately African-American sample, including peer social support, using accelerometer estimates, and using a more powerful product of coefficients mediation approach.

Few studies focus on underserved adolescents and leisure time PA as compared to structured PA, and most

use self-reported PA.[56,57] The current study is among the first to demonstrate that social support (mainly emotional and modeling aspects) is significantly related to PA in underserved adolescents using accelerometry data and that this effect is partially mediated by motivation. This is particularly important for underserved populations who have been shown to engage in less PA and receive less social support.[58] SDT emphasizes the generalizability of the key constructs across race/ethnicity, socioeconomic status (SES), gender, and other demographics; however, little research has been conducted in underserved populations to confirm this. The current study provides some support of the potential success of that body of research extending to inform interventions in underserved youth who may require unique perspectives on social contextual and motivational influences of PA.

Limitations of the current study should also be noted. Cross-sectional data were used and thus prevent causal inferences. Results of the current study are consistent with the directions found in experimental research showing that social support increases motivation and PA[27] and prospective studies[26] showing social context affecting autonomous motivation and then behavior. However, reciprocal effects cannot be ruled out, and a longitudinal dataset, not available for the current study, is needed to test the direction. It is possible that engaging in PA also affects motivation and social support, and reciprocal relationships that are unaccounted for would inflate unidirectional affects. Past literature has tested mediation models cross-sectionally,[32,59,60] and these can be used as a first step toward determining significant factors to consider in longitudinal and intervention mediation research. Additionally, the magnitudes of the relationships were modest and only account for a small portion of the variance in PA. However, accelerometer measures of PA have been shown to exhibit weaker relationships as compared to self-reported estimates. The effect sizes in the current study are consistent with other studies using accelerometer estimates of PA[17,61] and build on the literature by using a large sample of underserved youth. Additionally, because the ACT trial was a large trial in an underserved population, the study was limited in its ability to include multiple measures that could more accurately reflect the specific assumptions of SDT. The trial sought to integrate a motivational and behavioral skills intervention, and thus the current study measures relate to social context and motivation more broadly. Despite the above limitations, the present study also has some important strengths, including the large, diverse sample of boys and girls, accelerometry estimates of PA, and two measures of the social context.

Conclusion

The present study provides support for motivation as a partial mediator between peer social support, and to a lesser degree parent social support, and MVPA in underserved youth. The high percentages of overweight and inactivity in the current sample emphasize the importance of understanding PA in underserved youth who are at an increased risk for negative health trajectories. Results indicate that motivation may be an important variable to consider in PA behavior and peer influences in underserved youth as well as in future longitudinal research. However, more research is needed, particularly in exploring causal mechanisms of effects of social context on PA and in underserved youth.

Acknowledgments

This article was supported by two grants funded by the National Institute of Child Health and Human Development to Dawn Wilson (R01 HD045693) and the National Institute of Diabetes and Digestive and Kidney Diseases to Hannah Lawman and Dawn Wilson (F31 DK086358).

Author Disclosure Statement

No competing financial interests exist.

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