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Healthcare Provider Communication in Teens with Type 1 Diabetes: Parental Overprotection and Interpersonal Effectiveness Skills

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HEALTHCARE PROVIDER COMMUNICATION IN TEENS WITH TYPE 1
DIABETES: PARENTAL OVERPROTECTION AND INTERPERSONAL
EFFECTIVENESS SKILLS

A Thesis Presented

By

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Abstract

Type 1 diabetes (T1D) is a complex chronic illness requiring both complex daily treatments and ongoing healthcare provider interactions to support optimal glycemic levels necessary for long-term health and quality of life. Adolescents do not manage their T1D by themselves but rather in collaboration with parents who often help in health tasks and navigating healthcare provider interactions. Although parental support is critical for the adolescent's development of disease-management skills, it requires parents maintain a delicate balance of allowing adolescent autonomy and providing parent support. When parental support shifts to parental overprotection, i.e., restricting and limiting an adolescent's activity engagement, it may impair adolescent's skill development and mastery necessary to complete diabetes-management tasks independently, including healthcare provider communication. In particular, parental overprotection may impact the adolescent's interpersonal effectiveness skills, in that adolescents may not learn how to be mindful and attentive to relationships or build a repertoire of mindfulness and self-compassion that would support effective healthcare provider communication and more independent diabetes management. Thus, adolescent experiences of interpersonal effectiveness skills, parental overprotection, and healthcare provider communication may have long-term implications for diabetes outcomes as the adolescent transitions to adulthood. Adolescents with type 1 diabetes might then benefit from an intervention targeted at interpersonal effectiveness skills to both reduce parental overprotection and improve healthcare provider communication.

Adolescent participants (n=25, mean age=16.25, 56% female) completed a baseline survey for a pilot intervention study aimed at increasing mindfulness and decreasing diabetes-related stress. Adolescents reported on mindfulness, self-compassion, parental overprotection, and health care provider communication. The present study found that increased adolescent perception of parental overprotection was associated with decreased interpersonal effectiveness skills (mindfulness and self-compassion) and all were associated with increased difficulty with communicating with healthcare providers about diabetes. In addition, the potential utility of a mindfulness intervention for improving interpersonal effectiveness skills, decreasing parental overprotection, and improving adolescent healthcare provider communication was examined. The results also indicate potentially meaningful change scores for the four variables of interests between treatment and waitlist groups with very small to large effect sizes that may accrue into meaningful changes across time. Further, among adolescents who were highly engaged in the intervention program (n=11), mindfulness, self-compassion, parental overprotection, and healthcare provider communication again showed potentially meaningful change scores with small to medium effect sizes that may have long-term impact across time. These findings indicate that a mindfulness-based intervention has potential utility, especially for participants who were highly engaged in the program. Parental overprotection and interpersonal effectiveness skills may be key factors to target in interventions to support the transition of diabetes-management behaviors from parent to adolescent as the adolescent ages into young adulthood, particularly with regard to adolescents learning to communicate with their healthcare providers.

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Healthcare provider communication in teens with type 1 diabetes: Parental overprotection and interpersonal effectiveness skills

Type 1 diabetes is one of the most common childhood chronic illnesses with a growing incidence rate of an estimated 18,000 new cases diagnosed each year (CDC, 2020). Type 1 diabetes occurs when insulin-producing beta cells in the pancreas are destroyed via an autoimmune process and the body no longer produces the hormone insulin (Atkinson et al., 2014). Insulin has a life-sustaining role within the body, as it aids in the body's use of glucose for energy. Without insulin, cells are unable to uptake glucose for energy and there is no signal to convert glucose to glycogen and store glycogen in the liver as a future energy source. Insulin is involved in many physiological processes including metabolizing carbohydrates, fats, and protein. Common symptoms of type 1 diabetes include polydipsia (increased thirst), polyphagia (increased hunger), and polyuria (increased urination) in addition to hyperglycemia. These symptoms manifest as a homeostatic mechanism wherein the body tries to rid excess blood glucose through increased hydration and urination, and hunger increases to meet the increased need for energy (Atkinson et al., 2014). There is presently no cure for type 1 diabetes, and despite the development of intensive medical regimens to reduce health risks, an estimated 83% of adolescents with type 1 diabetes do not meet clinical guidelines for optimal diabetes self-management (Foster et al., 2019).

To maintain optimal health, adolescents with type 1 diabetes must engage in numerous complex daily tasks and frequent medical appointments with specialist pediatric endocrinology healthcare providers. Type 1 diabetes self-management requires daily behaviors such as counting carbohydrates, checking blood glucose, and dosing

insulin (Livingstone et al., 2015). Coffen (2009) found that to properly manage type 1 diabetes, adolescents must engage in at least 600 diabetes-related behaviors. Without proper management, type 1 diabetes leads to numerous short-term and long-term health complications. Short-term health complications include life-threatening diabetic ketoacidosis and hypoglycemia. Long-term health complications from suboptimal management include increased risk of cardiovascular disease and renal disease (Gagnum et al., 2018; Helve et al., 2018; Rawshani et al., 2018). Due to the immense number of medical tasks required to properly manage type 1 diabetes, it is not a “do-it-yourself” disease; effective communication between adolescents and their healthcare providers is critical for optimal glycemic outcomes (Croom et al., 2011; Mohn et al., 2015; Patel et al., 2018). Yet, adolescents with type 1 diabetes face many challenges with both diabetes treatment engagement and healthcare provider communication.

Healthcare Provider Communication and Parental Involvement in Diabetes Management

Despite the importance of healthcare provider communication for diabetes outcomes, adolescents report frequent distressing experiences with diabetes health visits and interference from parents in developing autonomy in healthcare provider communication. Adolescents often perceive physician visits as stressful experiences, citing concerns about physician confrontation about suboptimal HbA1c levels (Lowe et al., 2015). Further, adolescents have reported hesitancy in asserting questions or concerns to their physician that may be perceived as low treatment engagement, such as questions about carbohydrate counting or dosing insulin (Beresford & Sloper, 2003). In general, patients report feeling as though healthcare providers do not elicit their feedback for

treatment plans and patients are often interrupted during office visits (on average every 11 seconds; Singh Ospina et al., 2018). Given the heightened emotional state of diabetes health visits, adolescents need ample opportunities to practice communicating with their healthcare team, an essential experience to increase autonomy in diabetes self-management. However, Holtz and colleagues (2020) indicated that during adolescent healthcare visits, physicians largely talk to the parent rather than the adolescent, which may decrease opportunities for adolescents to improve communication with healthcare providers. There is currently a lack of research examining adolescents' experiences with diabetes healthcare provider communication and how that is associated with different types of parental involvement in diabetes management.

Parental overprotection, parental restriction and limitation of activities due to an adolescent's illness (Peterson & Harrison, 2018), may hinder adolescents' opportunities to learn essential healthcare provider communication skills and behaviors necessary for them to independently maintain their health into adulthood. First asserted in the early 1930's, Levy (1931) described parental overprotection as parenting characterized by overly solicitous or overanxious parenting behaviors. Pinkerton (1970) expanded the functional implications of parental overprotection by describing that parental overprotection encompasses the "denial of the chance to adapt realistically", which may limit a child's ability to behave in a way that is within their abilities. Pinkerton also purported that parental overprotection may stem other factors aside from the child's chronic condition and may be due to underlying parent psychopathology, such as stress or anxiety. Following Pinkerton's work in the early 1970's, Mattson (1972) credited the onset of parental overprotection for a child with chronic disease as stemming from

parental stress and guilt about their child's disease, which may then translate to overprotective behaviors. More recent work has described parental overprotection as a set of highly vigilant, highly controlling behaviors that discourage independent, developmentally appropriate behavior that is within the child or adolescent's ability (Thomasgard & Metz 1993, 1997).

Parental overprotection has been studied in regard to various chronic illness populations, such as spina bifida, cancer, and food allergy (Chow et al., 2015; Holmbeck et al., 2002; Hullman et al., 2010). Research in this domain has emphasized examining parental overprotection as parental restriction and limitation of activities due to the adolescent's illness, which separates parental overprotection from other features of parenting behavior such as parental control, rigidity, or warmth (Peterson & Harrison, 2018; Thomasgard et al., 1995). However, to date, there is not a diabetes-specific measure of parental overprotection that addresses the social activity limitation and restriction that may characterize an overprotective parental response to the stressors and medical concerns of type 1 diabetes. Despite limited research on parental overprotection in adolescents with type 1 diabetes, examining parental overprotection remains critical as parents of children with type 1 diabetes experience high levels of distress following the diagnosis of type 1 diabetes, that may leave them more vulnerable to engage in parental overprotection (Noser et al., 2019; Whittemore et al., 2012).

Beyond the scope of parental overprotection, there is a substantial body of research on parental involvement in type 1 diabetes management and diabetes outcomes that further supports the potential importance of considering parental overprotection and healthcare provider communication skill development in adolescents. Research into the

role of parental involvement with type 1 diabetes has largely examined the role of parental monitoring, responsibility sharing for diabetes tasks, and persuasive strategies, which are adjacent to but do not encompass the construct of parental overprotection. For example, Wiebe (2005) found child perceptions of parental control in the performance of diabetes tasks was associated with suboptimal glycemic outcomes for older adolescents but not younger adolescents. Another study found that for younger adolescents, greater parental monitoring can increase treatment engagement (Ellis et al., 2007). However, the lack of follow-up data in these studies limits our understanding of the long-term effects of different types of parental support on adolescent autonomy and independence in diabetes management tasks, including healthcare provider communication. For example, the use of parental persuasive strategies, such as reminding and persuading adolescents to manage diabetes, may improve next day glycemic levels but also decreases adolescent's confidence in their ability to independently manage their diabetes (Berg et al., 2013). Further, research shows that adolescents who experience a greater level of illness intrusiveness by parents may feel more consumed by their diabetes (Raymaekers et al., 2020). Overall, there may be a fine line between parent support and parental overprotection, wherein parent support may help improve type 1 diabetes outcomes, and parental overprotection may hinder the development of adolescent autonomy in diabetes management, including with healthcare provider communication. Thus, in the present study it was theorized that increased adolescent perception of parental overprotection, parental restriction and limitation of activities due to an adolescent's illness, would be associated with adolescents' perceptions of less effective communication with diabetes healthcare providers.

Interpersonal Effectiveness Skills as an Intervention Target to Reduce Perception of Parental Overprotection and Improve Healthcare Provider Communication

One pathway through which parental overprotection might hinder the development of effective diabetes healthcare provider communication in adolescents with type 1 diabetes is through the interplay of parental overprotection and interpersonal effectiveness skills across development (see Figure 1). Interpersonal effectiveness skills encompass a repertoire of social skills, assertiveness, listening, and negotiation skills necessary to build and maintain relationships (Linehan, 1993). One aspect of interpersonal effectiveness is mindful attention. Mindful attention is necessary for interpersonal effectiveness as it helps an individual remain in the “here and now” and notice cues about others’ needs and reactions in addition to one’s own experience in relation to another person (McKay et al., 2007). A second aspect of interpersonal effectiveness is self-compassion. While mindfulness focuses on being present in the “here and now”, self-compassion focuses on being non-judgmental and non-critical of oneself or of the moment. Combined, both facets of interpersonal effectiveness skills lead to the person being aware of the present moment without being critical of themselves or the moment, but rather experiencing the moment with self-compassion and acceptance of the moment of interpersonal interaction (Linehan, 1993; McKay et al., 2007).

Parental overprotection might disrupt the development of interpersonal effectiveness skills including mindfulness and self-compassion, while lower interpersonal effectiveness skills may elicit greater parental overprotection. When parents limit youths from being exposed to distressing interpersonal events or normative social developmental experiences, adolescents are unable to develop or maintain interpersonal effectiveness skills. For example, parental overprotection predicts decreased self-compassion (Pepping

et al., 2014) and increased interpersonal difficulties for individuals with social anxiety (Taylor & Alden, 2006). At the same time, adolescents with lower interpersonal effectiveness skills might have parents who engage in more overprotection in response to concerns of the adolescent's ability to navigate complex interpersonal relationships, including those with healthcare providers (Speller-Brown et al., 2015). Increased parental overprotection for adolescents who have yet to develop interpersonal effectiveness skills may further hinder the development of interpersonal effectiveness skills and effective healthcare provider communication due to lack of opportunities to practice such skills. However, research in adolescents with type 1 diabetes has not yet considered if parental overprotection is associated with fewer interpersonal effectiveness skills, nor if lower interpersonal effectiveness skill, in particular for mindfulness and self-compassion, is associated with less effective communication with diabetes healthcare providers. It was theorized that decreased mindfulness and self-compassion in adolescents with type 1 diabetes would be associated with increased adolescent perception of parental overprotection and increased difficulty with communicating with healthcare providers.

Moreover, limited research has explored how psychosocial interventions may improve adolescent diabetes healthcare provider communication and reduce parental overprotection by supporting adolescents in building mindfulness and self-compassion skills. Increasingly research has examined mindfulness-based interventions for adolescents with type 1 diabetes, finding benefits for a variety of health outcomes. Mindfulness-based interventions have been noted to be effective at improving mindfulness, quality of life, diabetes distress, and glycemic outcomes for adolescents and young adults with type 1 diabetes (Ellis et al., 2018; Nagel et al., 2020; Van Sant-Smith,

2019). Other mindfulness-based interventions focused on self-compassion in adolescents with type 1 diabetes found increases in self-compassion as well as reduced HbA1c levels (Boggiss et al., 2020; Friis et al., 2016). These data indicate that a mindfulness-based intervention may improve both aspects of interpersonal effectiveness skills, which may then support adolescent diabetes healthcare provider communication and reduce parental overprotection. Thus, it was also hypothesized that participation in a scalable mindfulness-based intervention for adolescents with type 1 diabetes would be associated with increased mindfulness and self-compassion as well as adolescent perceptions of effectiveness of diabetes healthcare provider communication and decreased adolescent perception of parental overprotection.

The present study had two primary aims. The first aim was to examine the association between interpersonal effectiveness skills, parental overprotection, and healthcare provider communication. It was hypothesized that decreased mindfulness and self-compassion, increased parental overprotection, and decreased healthcare provider communication effectiveness would be associated. The second aim of the present study was to examine if a scalable, online mindfulness-based intervention benefited interpersonal effectiveness skills, parental overprotection, and healthcare provider communication. It was hypothesized that participation in the intervention compared to a wait-list control group would be associated with both increased mindfulness and self-compassion as well as decreased adolescent perception of parental overprotection and improved adolescent healthcare provider communication.

Methods

Participants

The study includes 25 adolescents, ranging from 14-18 years old (14 females; 56%). The average age of participants was 16.25 years old (SD= 1.6 years, min=14.13 years, max=18.92 years). Out of the 25 adolescents in the study, the majority identified as White (n=22; 88%). One participant self-identified as Asian, one identified as Native Hawaiian or Pacific Islander, and one participant identified as bi-racial. The average HbA1c level at baseline was 8.3% (SD=2.1, min=6, max=13). Participants reported on length of diagnosis at baseline, which ranged from less than a year to 16.15 years (M=5.3, SD=4.1). Most participants reported using a continuous blood glucose monitor (76%), while 17 participants reported using an insulin pump (68%). Socioeconomic status was examined using adolescent report of free school lunch (40% free school lunch). Inclusion criteria included diagnosis of type 1 diabetes, adolescent aged 13-19, and must be currently attending school or a recent high school graduate. Adolescents were excluded from the study based on status as ward of the state, endorsed active psychosis, or had a severe developmental delay that would have led to issues with self-report.

Procedure

Procedures were approved by the Institutional Review Board at the University of Nevada, Reno. Electronic parental consent and child assent were obtained for participants under the age of 18 and electronic consent was obtained for participants 18 and older. Recruitment for participants occurred through flyers at a regional diabetes camp, regional diabetes support groups, and direct recruitment by research staff in a local pediatric endocrinology clinic. After obtaining consent, participants completed a baseline survey.

Following the completion of the baseline survey, participants were randomized to one of two groups; 10-week intervention immediately or waitlist to begin intervention in 10 weeks. To balance across intervention and waitlist groups, computerized stratified randomization was used based on gender, length since diagnosis (at or below 2 years versus more than 2 years), and recent HbA1c (at or below 8.5 versus at or above 8.6).

The initial research plan called for 60 participants. Study recruitment ended before 60 participants at an interim stop-point, when only 29 participants were enrolled, due to issues with feasibility and acceptability of the intervention model. During the recruitment phase of the study, 64 participants indicated interest in the study and were contacted by research staff. Five participants declined further screening and two participants were not eligible for the study given the exclusion criteria. At the interim stop point, 29 participants had consented and been enrolled in the study, while an additional 28 participants expressed interest in the study but did not complete the consent process prior to the recruitment stop point. Out of the 29 consented participants, 25 completed the baseline assessment and were randomized to either intervention now (n=15) or waitlist (n=10). Stratified randomization was based on the planned 60 participants and ending recruitment at the early stop-point led to imbalance in the size of the two groups. Four enrolled participants passively declined to complete the baseline survey and were not randomized. During the study, two participants withdrew from the study after completing the baseline assessment (reasons: busy with school, intervention schedule was stressful for them), an additional nine participants were lost to follow-up at 10-weeks and another six participants were lost to follow-up at 20 weeks. Figure 2 provides further information on participant flow.

Intervention Program. The mindfulness-based intervention delivered in the present study was based on an evidence-based teen MBSR program and workbook, with online communication throughout the 10 weeks where the participant was active in the intervention. During the active intervention, participants were assigned weekly reading and activities from an MBSR book for teens (Biegel, 2017). The weekly assignments were estimated to not exceed 30 minutes of reading per week. The weekly assignments covered topics including understanding stress, introduction to mindfulness, living in the now, things you cannot control, and other mindfulness-based intervention principles. Aligned with traditional MBSR, the assigned mindfulness exercises were recommended to be completed daily. The intervention included a mixture of self-led exercises as well as exercises that were accompanied with audio instructions. Participants received email prompts to remind them of the weekly assignments (Sunday) and prompts to engage in mindfulness exercises (Wednesday).

Participants were eligible to earn up to \$50 in Amazon gift cards for compensation. Completion of baseline, 10-week follow up, and the 20-week follow-up were compensated at \$10 gift cards each. Short weekly surveys were emailed participants to assess feasibility and acceptability of the intervention, participants who completed at least six out of the 10 weekly surveys received \$10 gift cards. Additionally, participants who completed all 10 weekly surveys received an additional \$10 gift card.

Measures

Adolescent Perception of Parental Overprotection. The Diabetes Stress Questionnaire (DSQ; Delameter et al., 2013) consists of 65 items and includes eight subscales: Distress-Worry, Peer Stress, Averse Interpersonal Effects, Parental Stress,

Hyperglycemia, Self-Care Regimen, Diet, and Hypoglycemia). Adolescents rate items regarding their perceived diabetes stress on a 4-point scale (0=not at all, 3=very much). While a DSQ subscale measures Parental Stress broadly (i.e., stress related to parent involvement in diabetes management), for the purpose of the present study, only one item will be examined as it directly assesses for parental overprotection (“My parents being too protective of me, like not allowing me to do things other kids can do because of my diabetes”). Participants responded to how problematic parental overprotection is on a four-point scale (“not at all”, reported “a little”, reported “pretty much”, and reported “very much”). Additionally, while a full parental overprotection scale would be ideal, there is support for the use of single-item measures to be satisfactory in terms of validity and reliability (de Boer et al., 2004; Elo et al., 2003).

Interpersonal Effectiveness Skills. The Mindful Attention Awareness Scale-Adolescent (MAAS-A; Brown et al., 2011) was used to assess dispositional mindfulness. The MAAS-A consists of 14 items and is rated on a 6-point scale (1=almost always, 6=almost never), with higher scores indicating higher dispositional mindfulness. The MAAS-A has high internal consistency, test-retest reliability, and incremental validity (Brown et al., 2011). Strong internal consistency was found for the study’s sample ($\alpha = .92$). The Self-Compassion Scale (SCS; Neff, 2003) consists of 26 items that assesses six facets of self-compassion (Self-Kindness, Self-Judgement, Common Humanity, Isolation, Mindfulness, Over-Identification). Rated on a 5-point scale (1=almost never, 5=almost always), participants rate how often they engage in self-compassionate behavior in various situations. A total score is calculated by summing all items, where items on Self-Judgement, Isolation, and Over-Identification are reverse coded. The SCS has been

shown to have good internal consistency ($\alpha = 0.92$; present study sample $\alpha = .95$) and convergent validity with adolescents (Cunha, Xavier & Castilho, 2016).

Healthcare Provider Communication. The PedsQL 3.2 -Diabetes Module (PedsQL- DM; Varni et al., 2018) measures diabetes-specific, health-related quality of life for children and adolescents. The PedsQL-DM consists of 33 items and includes five subscales: Diabetes Symptoms, Treatment Barriers, Treatment Adherence, Worry, and Communication. Participants rate items on a 5-point scale (0=never, 4=almost always). The Communication subscale is comprised of four items, two of which address healthcare provider communication and two regarding other social aspects of communicating about diabetes, including “It is hard for me to explain my illness to other people” and “I am embarrassed about having diabetes”. For the purpose of the present study, two face valid items were used to examine healthcare provider communication. The two items that index adolescent perceptions of healthcare provider communication are “It is hard for me to tell the doctors and nurses how I feel” and “It is hard for me to ask the doctors and nurses questions”. The two items had strong internal consistency in the present sample ($\alpha = .82$).

Analysis

The aim of the present study is two-fold. First, to examine the association between interpersonal effectiveness skills, parental overprotection, and healthcare provider communication, Pearson correlations were conducted with baseline assessment data from all enrolled participants. Second, improvements in interpersonal effectiveness, adolescent perception of parental overprotection, and healthcare provider communication following a mindfulness-based intervention were examined.

For aim two, the analysis plan was guided by previously conducted feasibility and acceptability assessments for the intervention program (Humiston et al., in preparation). With regards to missing data, the feasibility and acceptability of the MBSR intervention program was examined at the interim stop point, with a primary concern related to acceptability being participant loss to follow-up once participating in the program (see Figure 2; 11 participants by 10 weeks and 17 by 20 weeks). To address missingness in data, a conservative intent-to-treat approach was used, where the last available indicator of interpersonal effectiveness, adolescent perception of parental overprotection, and healthcare provider communication were carried forward as the outcome (effectively leading to null change). With regards to adolescent engagement in the mindfulness program, or “treatment as intended”, weekly feedback during the intervention provided an index of participant engagement in intervention material, as participants only received payment if at least 6 of 10 completed intervention feedback surveys. Using this as an index of engagement, 11 participants were highly engaged, and 14 participants showed low engagement. Dichotomizing between high engagement and low engagement allowed for exploration beyond between group differences, intervention vs waitlist at 10-weeks, to include within group differences pre- and post-intervention for the highly engaged participant group who received the treatment as intended.

Thus, we conducted two analyses for the second aim. First, independent samples t tests were used to examine differences between treatment and waitlist groups for changes in mindfulness, self-compassion, adolescent perception of parental overprotection, and healthcare provider communication from baseline to 10-week follow-up. Second, paired samples t tests were conducted to examine differences from pre- to post-treatment in

mindfulness, self-compassion, adolescent perception of parental overprotection, and healthcare provider communication, and for participants who were highly engaged in the intervention.

Due to sample-size power constraints for both aims, results of all analyses were considered in light of effect sizes rather than p values. Results were interpreted using Funder and Ozer (2019) effect size evaluation standards. Funder and Ozer (2019) indicate a different interpretation of effect size than Cohen's convention, with an approach that emphasizes identifying meaningful effect sizes based upon potential contribution to immediate effects (larger effects) versus downstream accrual (smaller effects repeated across time) of effects for clinical benefits. For example, Funder and Ozer (2019) identify an effect size of $r = .05$ to indicate a very small effect at a single event that may be potentially consequential in the future if the event recurs regularly in daily life. Further, an effect size of $r = .10$ may show a small effect at the single event level but may be more consequential in the long term. An effect of $r = .20$ would indicate a medium effect that shows practical and explanatory use in both short and long term. An effect size of $r = .30$ would be a large effect in both short and long term. With these descriptions in mind, in the present study correlations will be noted as a meaningful effect size when greater than or equal to $r = .30$, as for cross-sectional associations of trait variables it is likely more important to have effects that are large, immediate effects with long-term implications. For both paired and independent t tests, effect sizes of r of at least $.05$ (Cohen's d equivalent of $.10$) will be used as the benchmark for a meaningful effect as a small, immediate effect of the intervention has the potential to accrue across many daily

interactions toward the development of greater interpersonal effectiveness over a longer period of time.

Results

Increased adolescent report of parental overprotection was associated with decreased adolescent-reported self-compassion ($r = -.58, p = .002$) and decreased mindfulness ($r = -.57, p = .003$). Increased adolescent report of parental overprotection was associated with increased difficulty in communicating with healthcare providers ($r = .60, p = .001$). Both interpersonal effectiveness skills, increased mindfulness and self-compassion, were then associated with adolescents reporting decreased difficulty in talking to healthcare providers ($r = -.35, p = .09$; $r = -.39, p = .06$).¹²

Difference scores in mindfulness, self-compassion, perceived parental overprotection, and healthcare provider communication were calculated from baseline to 10-week follow-up for all participants. Independent samples t-tests were conducted comparing difference scores for treatment and waitlist control groups. For mindfulness, the treatment group showed increases in mindfulness and the waitlist group decreases in

¹ Given we used only 2 of 4 items on the validated Communication subscale of the PedsQL-Diabetes Module that emphasized healthcare provider communication, we also wanted to examine if communication more broadly shared similar associations with parental overprotection and interpersonal effectiveness skills. The full communication subscale of the PedsQL-Diabetes Module was similarly associated with mindfulness and self-compassion, $r = -.37, p = .07$, $r = -.56, p = .004$, respectively, and with parental overprotection, $r = .56, p = .004$, suggesting healthcare provider communication is one area within diabetes communication more broadly that might benefit from decreased parental overprotection and increased interpersonal effectiveness skills.

² Given we used only 1 of 7 items on the validated Parental Stress subscale of the DSQ that emphasized stress related to parents, we also wanted to examine if stress related to parent involvement in diabetes management more broadly shared similar associations with interpersonal effectiveness skills and healthcare provider communication. The full Parental Stress subscale of the DSQ was similarly associated with mindfulness and self-compassion, $r = -.40, p = .05$, $r = -.47, p = .02$, respectively, but not with healthcare provider communication, $r = .28, p = .17$, suggesting that activity restriction (parental overprotection) is a unique area within parental stress more broadly that might impact healthcare provider communication, where parent stress may share broader associations with interpersonal effectiveness.

mindfulness at follow-up, ($t(23)= 1.8, p=.86, d=.17$; Treatment: $M=.02, SD=.50$; Waitlist: $M= -.07, SD=.50$), with a very small to small intervention effect size. For self-compassion, the treatment group again showed increases in self-compassion and the waitlist group decreases in self-compassion at follow-up, ($t(23)= -1.8, p=.43, d=.72$; Treatment: $M=.26, SD=.50$; Waitlist: $M= -.07, SD=.40$), with a small to medium intervention effect size. For parental overprotection, the treatment group showed decreases in challenges with parental overprotection and the waitlist group increases in challenges with parental overprotection ($t(23)=1.7, p=.09, d=.64$; Treatment: $M= -.33, SD=.90$; Waitlist: $M=.10, SD=.32$), with a large intervention effect size. For healthcare provider communication, the treatment group showed decreases in challenges with healthcare provider communication and the waitlist group increases in challenges with healthcare provider communication ($t(23)= 1.8, p=.23, d=.76$; Treatment: $M=-.17, SD=.59$; Waitlist: $M=.40, SD=.89$), with a large intervention effect size.

Finally, paired t tests for the highly engaged group only ($n = 11$) compared pre- to post-intervention scores. For mindfulness, the highly engaged adolescents showed increased mindfulness from baseline to post-intervention ($t(10)= -.18, p=.86, d=.06$; Pre-treatment $M= 4.29$, Post-treatment $M= 4.31$), with a very small intervention effect size. For self-compassion, the highly engaged adolescents showed increased self-compassion from baseline to post-intervention, ($t(10)= -1.3, p=.21, d=.41$; Pre-treatment $M= 3.15$, Post-treatment $M= 3.42$), with a medium intervention effect size. For parental overprotection the highly engaged adolescents showed decreases in problems with parental overprotection ($t(10)= 1.4, p=.19, d=.42$; Pre-treatment $M= 1.18$, Post-treatment $M= .91$), with a medium intervention effect size. Finally, for healthcare provider

communication the highly engaged adolescents showed decreases in challenges with healthcare provider communication ($t(10) = 1.8, p = .11, d = .527$; Pre-treatment $M = 1.0$, Post-treatment $M = .73$), with a medium intervention effect size.

Discussion

Consistent with our hypotheses, the present study found that decreased interpersonal effectiveness skills (mindfulness and self-compassion), increased adolescent perception of parental overprotection, and increased difficulty with communicating with healthcare providers about diabetes were all cross-sectionally associated in adolescents with type 1 diabetes. In addition, we also found that a self-led MBSR program was associated with changes in mindfulness, self-compassion, adolescent perception of parental overprotection, and healthcare provider communication with very small to large effects that may be consequential across time. Further, we found that adolescents with type 1 diabetes who were highly engaged in the MBSR program experienced very small to medium effects on changes in mindfulness, self-compassion, adolescent perception of parental overprotection, and healthcare provider communication from pre-to-post treatment. These findings are consistent with our hypotheses and indicate that a mindfulness-based intervention may have utility for improving interpersonal effectiveness skills, decreasing adolescent perception of parental overprotection, and increasing healthcare provider communication in adolescents with type 1 diabetes.

The findings regarding the cross-sectional associations between facets of interpersonal effectiveness skills, mindfulness and self-compassion, and adolescent perception of parental overprotection are congruent with literature in other chronic illness

populations. For example, parental overprotection has predicted lower self-compassion in young adults (Pepping et al., 2015). Further, in a sample of adults with social anxiety disorder, retrospective accounts of parental overprotection were associated with present day interpersonal skills difficulties (Taylor & Alden, 2006). The present findings regarding parental overprotection and interpersonal effectiveness skills in adolescents with type 1 diabetes extends these findings to a new chronic illness population. Further, these findings highlight the importance of developing and validating a measure of parental overprotection in type 1 diabetes to support continued research in this domain, especially with regards to how parental overprotection and interpersonal effectiveness skills are interconnected across development for adolescents with type 1 diabetes.

In addition, the association of both interpersonal effectiveness skills and adolescent perception of parental overprotection with healthcare provider communication are congruent with similar literature regarding parenting and healthcare navigation. For example, Stiles-Shields and colleagues (2020) found that increased prosocial skills (including assertive communication skills) were significantly associated with parent report of adolescent level of medical responsibility, indicating that adolescents with prosocial skills are provided more opportunities to practice disease management skills to mastery with the help and supervision of their parents. Although Stiles-Shields et al (2020) examined parenting and medical responsibility in children with spina bifida, it is likely that the same developmental underpinnings also apply to interpersonal effectiveness skills, parental overprotection, and healthcare provider communication in adolescents with type 1 diabetes. Research also suggests that parental modeling of effective healthcare provider communication to their adolescents may be critical for

adolescent skill development and thus, supporting parents who engage in overprotection in modeling effective healthcare provider communication skills may be a possible avenue to support adolescents with type 1 diabetes (Sayal et al., 2010). Overall, the fine balance between parental involvement and parental overprotection has been noted in developmental psychology literature, wherein limiting or restricting a child's ability to independently engage in their environment can interfere with adolescent autonomy development (Allen et al., 1994; Herbert & Dahlquist, 2008).

The findings regarding the possible utility of a self-led MBSR program for improving interpersonal effectiveness skills, decreasing adolescent perception of parental overprotection, and increasing adolescent healthcare provider communication are consistent with literature on the use of mindfulness-based interventions for adolescents with type 1 diabetes. For example, mindfulness-based intervention programs have been helpful for improving a wide range of outcomes including quality of life, mindfulness, glycemic control, and diabetes distress (Ellis et al., 2018; Nagel et al., 2020; Van Sant-Smith, 2019) Additionally, Friis and colleagues (2016) found that a mindful self-compassion may be effective at improving self-compassion in individuals with diabetes. Scalable self-compassion interventions have also been deemed acceptable for increasing coping resources and mindfulness (Boggis et al., 2020). Further, the benefits of the mindfulness-based intervention for adolescent perception of parental overprotection and healthcare provider communication, may have perhaps occurred through improvements in interpersonal effectiveness skills. More specifically, the mindfulness-based intervention may have shifted how adolescents perceive and engage with emotionally valanced experiences, such as conflicts with parents and healthcare providers. Although

no prior research has examined mindfulness-based intervention with regards to parental overprotection and healthcare provider communication or mechanisms, research has linked mindfulness-based intervention with behavior change via changes in responding to emotionally valenced experiences. For example, increasing interpersonal effectiveness skills, including engaging in effective communication about emotions despite discomfort, may improve self-management of disease-management behaviors (Russell et al., 2019). With this in mind, it may be important for future mindfulness-based interventions to leverage the family unit when working with adolescents with type 1 diabetes, as the family environment is clearly an important context of care.

Finally, there were differences in effect sizes when examining between group and highly engaged within person effects (with larger effect sizes for the between group analyses compared to highly engaged within person analyses). Finding larger effect sizes between the treatment and control groups compared to the highly engaged persons who received the treatment as intended might have been driven by the worsening scores in the waitlist group more so than improvements in the treatment group. There are several hypotheses for this finding. First, it is possible that the finding was confounded by history effects due to the COVID-19 restrictions, wherein the waitlist group might have had worsened scores as pandemic restrictions were established and distress increased, while the treatment group was protected from the history effect by the mindfulness training. Second, it could also point to possible developmental concerns for adolescents with type 1 diabetes experiencing progressively worsened scores across the variables of interest without intervention. Future research should examine if there is a subset of adolescents who, across development, have more issues with interpersonal effectiveness, parental

overprotection, and healthcare provider communication as these all contribute to increased diabetes distress, which may decrease overall treatment engagement. If increasing interpersonal effectiveness may be a protective factor, future research should examine a more potent intervention to increase interpersonal effectiveness. Third, future research should also examine possible floor and ceiling effects of measures of interpersonal effectiveness, as the adolescents who were highly engaged in the treatment in the first place reported higher levels of interpersonal effectiveness (but not diabetes distress) at baseline, indicating a possible ceiling effect on improvement.

Limitations

As previously mentioned, the study and the described analyses are limited by sample size and will require replication in a larger sample. Moreover, related to the generalizability of the findings, the majority of participants identified as White, thus limiting the study's findings for persons of color that may face systemic racism and other barriers to engage in both diabetes management and the mindfulness study itself. The conclusions drawn from this study are also limited due to history threats, namely the COVID-19 pandemic, as some of the participants had completed the intervention prior to the pandemic occurring and some of the participants were enrolled or completed the intervention during the pandemic stay-at-home orders, which may have confounded both engagement in the participation as well as mindfulness scores. Although the average HbA1c level for participants was 8.3%, indicating that the sample included adolescents with suboptimal glycemic outcomes, the findings may not be generalizable for populations of adolescents with chronic suboptimal HbA1c levels. Finally, the study was limited by the measurement model for parental overprotection. The choice to use a single,

diabetes-specific item that was a face valid way to measure parental restriction of normative activities due to illness was necessary due to research indicating that parental overprotection varies dependent on the adolescent's illness (Hullman et al., 2010) and there were no existing measures of parental overprotection for adolescents type 1 diabetes management. Additionally, the lack of truly illness-specific measures is also a product of the lack of a specific operational definition of parental overprotection agreed upon by researchers.

Conclusions and Future Directions

While holding limitations in mind, the findings of the present study provide data to fill the gap of understanding the role of adolescent perception of interpersonal effectiveness skills, adolescent perception of parental overprotection, and healthcare provider communication in adolescents with type 1 diabetes. The findings indicate that there may be associations between interpersonal effectiveness skills, adolescent perception of parental overprotection, and healthcare provider communication; however, the direction of associations across time remains unclear. For example, it may be that increased parental overprotection may decrease opportunities for adolescents to engage in healthcare provider communication and practice effective interpersonal communication. On the other hand, it may also be the case where the lack of adolescents engaging in communication skills increases parental overprotection because of underlying distress about their child's diagnosis leading parents to overly engage in the adolescent's disease management tasks. Further longitudinal research is needed to clarify the direction of effects across development and how best to support the development of adolescent autonomy in healthcare provider communication and broader diabetes management.

Further research is also needed in defining and understanding the development of parental overprotection. The present study defined parental overprotection as parental restriction of normal activities due to diabetes; however, other measures have assessed parental overprotection behaviors more broadly as any anxious and controlling behavior in the disease context. Research is needed to develop more robust and specific measures of parental overprotection and determine how parental overprotection is linked with other features of parenting behavior and styles. In addition, given the role that parental stress may play in the onset and maintenance of parental overprotection, it may be important for future research to better understand how to intervene on interpersonal effectiveness skills of not only adolescents, but also parents. It may be that a family-based mindfulness intervention would target underlying stress impacting parents of children with chronic illness, and at the same time increasing interpersonal effectiveness skills and healthcare provider communication skills of adolescents. Thus, contextualizing disease management and putting the family dynamic at the center of the context of care is likely to show benefits for adolescents and parents alike. Family and/or group-based mindfulness interventions have been effective at improving a variety of outcomes in diabetes populations (Ellis et al., 2018; Sperry et al., 2013), yet research has not readily examined their effect on interpersonal effectiveness skills or healthcare provider communication for adolescents with type 1 diabetes.

Table 1*Means, standard deviations, and correlations with confidence intervals*

Variable	<i>M</i>	<i>SD</i>	1	2	3
1. Mindfulness	3.62	1.10			
2. Self-compassion	2.91	0.93	.67** [.37, .84]		
3. Parental overprotection	1.24	1.36	-.57** [-.79, -.23]	-.58** [-.80, -.25]	
4. Healthcare provider communication	1.30	1.28	-.35 [-.65, .05]	-.39 [-.68, .01]	.60** [.27, .80]

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. The confidence interval is a plausible range of population correlations that could have caused the sample correlation (Cumming, 2014). * indicates $p < .05$. ** indicates $p < .01$. High scores on healthcare provider communication indicate higher level of difficulty.

Figure 1
Developmental behavioral model of type 1 diabetes family care context

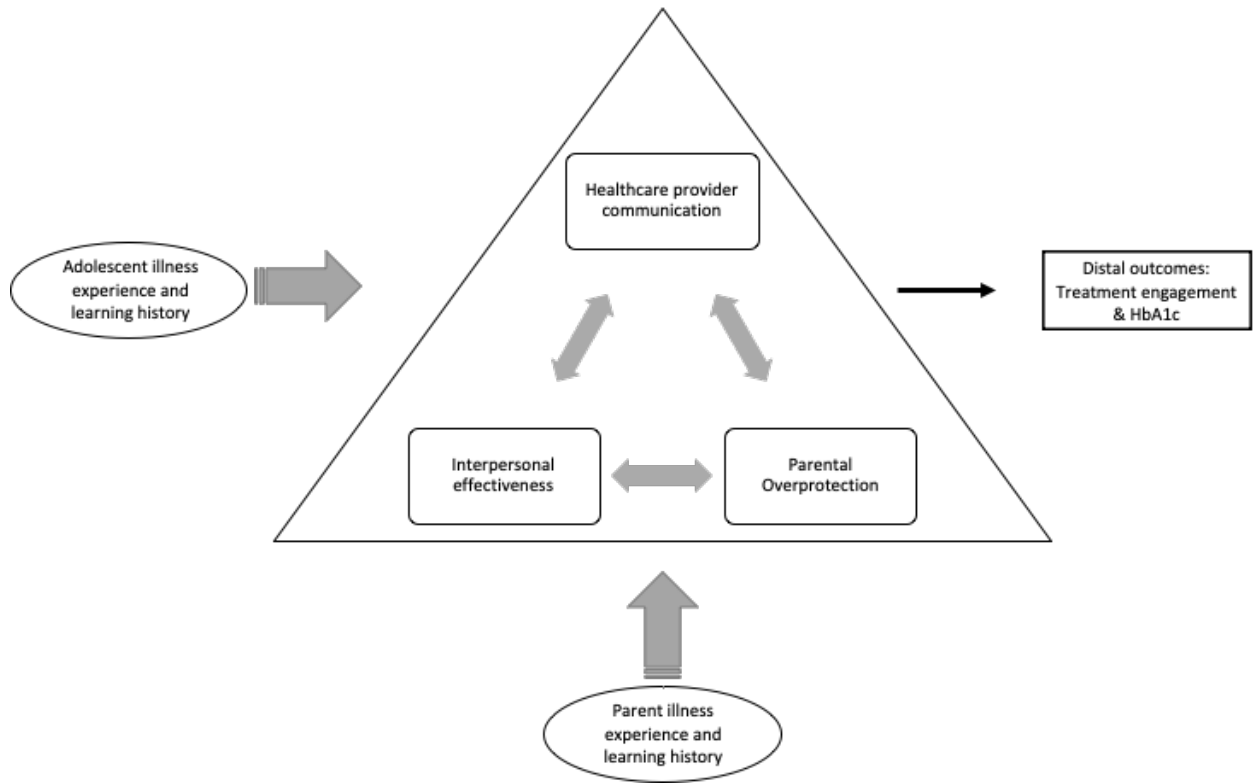
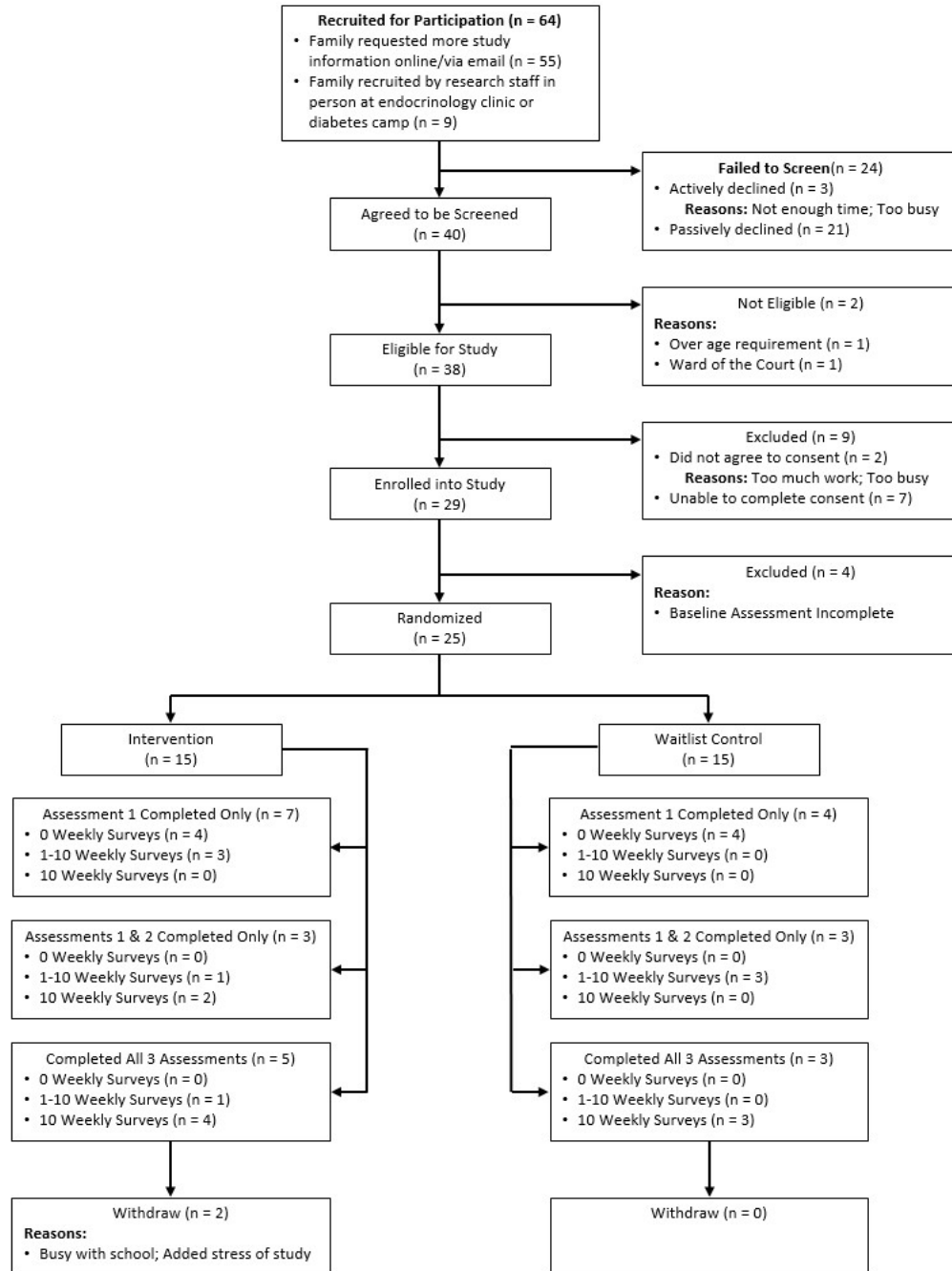


Figure 2

CONSORT table of participation



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