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Reflections on a Qualitative Public Health Study: The Experience of College Students with Type 1 Diabetes During the COVID-19 Pandemic

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Abstract

The onset of the COVID-19 pandemic brought novel challenges for many people, and college students with type 1 diabetes were no exception. College students with type 1 diabetes must manage their blood sugar levels unlike their non-diabetic peers. Also, conducting a public health qualitative research project is an extensive process that follows a non-linear path to completion. The purpose of this study was to understand the experience of college students with type 1 diabetes during the COVID-19 pandemic with the intention to inspire changes on college campuses to better support this student population. In addition, the reflections throughout this paper are designed to help future student-researchers better understand the process of conducting a public health qualitative research study. In this study, the principal investigator conducted ten semi-structured interviews with students from the College Diabetes Network (CDN) club at Western Washington University (WWU). Each interview lasted approximately 30-45 minutes in length and was transcribed verbatim. The researchers applied the six-phase thematic analysis to describe the emerging themes. The researchers found that the type 1 diabetic students experienced key challenges related to diabetes management, academics, and healthcare. Type 1 diabetes also impacted these students by limiting activities and career choices among other impacts. Other major themes are the implementation of effective management strategies including the use of technology, the importance of support from others, and the role of the university. In addition, the participants experienced heightened stress associated with the fear of COVID-19 infection due to their vulnerability. With reduced physical activity during COVID-19 lockdowns, participants suffered increased difficulties in glycemic control as well. To conclude, this population faces unique challenges, especially within the context of a global pandemic. Upon reflection, the experience of conducting this study gave the principal investigator greater appreciation for the dedication of career researchers, a better understanding of the human experience, and tangible lessons of communication and empathy that are applicable to a future career in medicine.

Key Words: Type 1 diabetes, COVID-19 pandemic, college students, public health research, qualitative research, personal reflection

Introduction

In May of 2016, I became excessively thirsty, had lost 20% of my body weight, and was using the restroom dozens of times a day. On May 10th, my parents drove me to Children's Hospital in Seattle, and I was diagnosed with type 1 diabetes. In the six years since that life-changing moment, I have learned so much about the condition, and my passion to improve my health has inspired me to become a physician. In March of 2021, when Dr. Ying Li agreed to be my honors capstone advisor, I knew I wanted to conduct a public health study. However, it took some time to settle on a topic, which I will discuss in the following paragraphs. This year-long journey has been an incredibly rewarding growth experience as I learned how to conduct a study from scratch!

Finding a Topic

As a pre-medical student, I wanted to conduct a health-related project, and the field of public health has always been of great interest to me. Fortunately, Dr. Ying Li of the public health major was willing to work with me. From the beginning, I was interested in a variety of research topics, but most of them centered around lifestyle health, a major passion of mine. In the early meetings with Dr. Li, we discussed the project timeline in addition to potential topics. We thought about everything from investigating the consequences of sugar consumption, sleep hygiene, time in nature, teaching modality, and cannabis use. Near the end of the quarter in June 2021, she instructed me to explore the literature for intriguing topics, with college students as the population of interest. Once we decided on a topic, then we could determine whether we wanted to conduct a qualitative or quantitative study. That summer I was working full-time at a summer camp for kids with special needs. Nevertheless, in the summer evenings after active days chasing after kids, I cruised around Google Scholar reading dozens of articles, I wrote notes on them, and I tried to find a study topic that would fill a "gap" in the literature. The main topics of my literature review included time in nature, sleep, the ketogenic diet, intermittent fasting, meditation, and nutrition. All these topics were in the context of college student health and academic performance.

Searching for a topic was an enjoyable, yet overwhelming, adventure. It was difficult to find an area of research that would be a unique contribution to science. With the goal from the start to publish our findings, this was on my mind throughout the literature search. When I met with Dr. Li in late August over Zoom, we had a breakthrough. We decided that it would be advantageous to narrow down our study population. We thought about just examining a population of college students with a chronic disease while asking a particular research question. Then I thought about focusing on a condition I am quite familiar with, type 1 diabetes. Of course, I live with this condition constantly, but I was largely unaware whether my daily reality was unique or part of a general college experience for this population. With a narrower population, we could more easily find a gap in the literature and fill it.

Fortunately, I was connected with the College Diabetes Network (CDN) club at WWU, so finding participants would likely not be challenging. With the small sample size available, we decided that a semi-structured qualitative interview approach would be best. For the next step, I had to figure out if there was "enough there" for college students with type 1 diabetes and assessing academic impact among other potential consequences of the condition. Therefore, I spoke with my cousin, who graduated from college and has type 1 diabetes, to figure out if we could gather some meaningful findings from this student population. After discussing potential

research topics and the experiences of this population during college, we figured out that there would be enough there to meaningfully investigate. With the confidence that this population would be worthwhile to study, I set out on another literature search. During September, I dove headfirst into type 1 diabetic college student research and made notes on a separate color-coded Word document. At the beginning of fall quarter, I met with Dr. Li, and we dialed in a plan to look at the impact of type 1 diabetes on college students, with additional questions about the pandemic. I was especially engaged in the project now because I was personally interested in learning more about the experience of a population I belong to.

The new, focused literature review was less overwhelming than the previous, broad search, although it still wasn't easy to find a gap. This period was a low point in the project for me as I struggled to find a gap in the type 1 diabetic college student literature. At the same time, I was coping with a recent relationship break-up. This difficult event later proved to be helpful as I devoted significant energy to this project to find life purpose outside of my previous relationship. A positive development came when we realized that framing the experience of this population in the context of the COVID-19 pandemic could be the key aspect which differentiates our qualitative study from the existing ones. Therefore, I also started reading anything I could get my hands on related to college students with type 1 diabetes during the COVID-19 pandemic. Fortunately, I couldn't find anything exactly like our developing study, so it looked like we had found our elusive gap!

As I gathered notes on the dozens of papers relating to our topic, Dr. Li encouraged me to start using Zotero to keep the papers and notes better organized. It wasn't easy to use the software at first, but I quickly realized it had tremendous utility. Dr. Li mentioned that before we started to craft an interview guide, she wanted me to write up a full draft introduction section. This assignment was to ensure I became an "expert" about the topic so she could feel confident with my knowledge and trust that I would draft an effective interview guide. Hence, I put in the hours to draft an introduction section. This assignment was unlike any introduction or literature review writing I had completed in my classes. In classes, I would use roughly a dozen papers, but I included about 40 references in this introduction section. Dr. Li explained to me that in the real world of science, you typically need at least 30 references in an introduction section because having a strong understanding of the background literature is critical- not just understanding the most influential papers.

Background

Some major takeaways can be drawn from the introductions section. The two main categories of findings were challenges and coping strategies. Type 1 diabetic college students face a variety of challenges, and a particularly common one is the "tension" between being a normal college student and a type 1 diabetic (Balfe, 2009; Hill et al., 2013). It can be difficult to balance diabetes with normal life activities, and it impacts all components of university life (Ramchandani et al., 2019; Saylor et al., 2019). Generally, college is a stage of life with significant stressors which include social commitments, stress about future plans, and academics (Ersig et al., 2019). Stress from academics can lead to poor glycemic control, and the dysregulated blood glucose levels from exam stress cause type 1 diabetic students to perform worse on exams (Fredette, 2016; Hill et al., 2013 Widowik et al., 1997). In addition, the stress from social engagement can cause students to reduce their involvement in favor of better glycemic control (Wilson, 2010). With these academic and social stressors in mind, the chief

concern of type 1 diabetic students may be hypoglycemia (Hill et al., 2013; Sato et al., 2003; Widowik et al., 1997; Wilson, 2010). University life for type 1 diabetics is challenging and stressful. Therefore, it is disappointing that in some cases, universities have hindered the experience of this population due to key issues with university dining and health services (Ersig et al., 2019; Fedor et al., 2017; Hill et al., 2013; Widowik et al., 1997).

Fortunately, many type 1 diabetics have found effective ways of coping with the challenges they face. For example, support from a variety of sources can positively impact self-care, mental health, glycemic control, and social health (Edwards et al., 2014; Ersig et al., 2019; Fedor et al., 2017; Fredette et al., 2016; Habenicht et al., 2021; Helgesen et al., 2014; Johnson, 2020; Saylor et al., 2018a; Saylor et al., 2018b; Tang et al., 2013; Walker et al., 2020; Widowik et al., 1997). In particular, peer support groups can offer notable benefits (Edwards et al., 2014; Ersig et al., 2019; Fedor et al., 2017; Fredette et al., 2016; Habenicht et al., 2021; Johnson, 2020; Saylor et al., 2018a; Saylor et al., 2018b; Widowik et al., 1997). A common campus-based diabetes support group is the College Diabetes Network (CDN), which has chapters at colleges across the United States, including at WWU. Participation in peer support groups, such as the CDN, is associated with lower diabetes stress and more effective self-care practices (Edwards et al., 2014; Johnson, 2020).

The final point from the literature concerns the experience of type 1 diabetics during the COVID-19 pandemic, and current research varies widely. It is important to recognize that type 1 diabetics may be at greater risk of COVID-19 complications than the general population. In fact, there is significant risk of diabetic ketoacidosis (DKA) during COVID-19 infection, and this may explain why type 1 diabetics are commonly more anxious than their nondiabetic peers about contracting COVID-19 (Chowdhury & Goswami, 2020). In addition, the impact of the pandemic on glycemic control seems to be mixed. A review found that the COVID-19 lockdown worsened glycemic control for some and improved it for others with influencing factors being meal quality and exercise among others (Chowdhury & Goswami, 2020). For example, Tornese and colleagues (2020) found that glycemic control for adolescence with type 1 did not worsen during the COVID-19 restrictions and actually improved during the time of complete lockdown. They found that physical exercise was a major factor that improved control. Aragona et al. (2020) also found that lockdowns improved glycemic control and hypothesized this could be due to reduced job-related stress and more consistent daily activities. With the novel challenges of the pandemic in mind and the consequences unclear, I was extra motivated to find answers in the interviews.

Once I had finished the introduction section, I was proud of my work, but I was humbled when Dr. Li mentioned that it was a good start and would need some significant editing before submitting for publication. However, she did say it was good enough to prove that I had a good understanding of the topic. Because I now had a better idea of what specifically to focus on, I had unlocked the next step: drafting the interview guide.

IRB Application

The interview guide was our first major step towards constructing our Institutional Review Board (IRB) application, and we could not begin recruiting and conducting interviews until being granted IRB approval. As I began creating the interview guide, I felt like I had made some major progress with the project. I had felt discouraged that I took so much time searching for an appropriate topic, but I now felt like we were on a solid track. With that said, I had never constructed an interview guide before. Fortunately, we identified a few central papers for our

study, and they included information that would help with drafting the interview guide. One paper in particular, Hill et al. (2013), used focus groups and included a list of the focus group questions in the article. Because the goals of my study aligned well with this study, the questions I constructed were greatly inspired by this paper. I thought this task would be quick, but Dr. Li emphasized the importance of this step to creating an effective study. The interview guide is the foundation of data collection, so the types and quality of data we extract from the interviews will be largely dependent on the quality of the interview guide. Therefore, it took many drafts until we reached a guide we both deemed to be sufficient.

We now had a comprehensive interview guide with questions and sub-questions that hit all the areas we wanted to investigate. Now we needed to put it to the test. Therefore, we set up a pilot interview in which Dr. Li interviewed me. It was fun to put myself in the shoes of a study participant, examine if the questions made logical sense, and determine if I was prompted to provide information that would help answer our research question. After the pilot run, we were both happy with how well the interview guide held up. During the interview, Dr. Li asked probing and follow-up questions, that were not written on the guide, when she wanted me to go into greater depth on certain topics I mentioned. She explained to me afterwards how important it is to ask these probing questions because they can help us learn more specifics and details from our participants' experiences. Overall, she emphasized that for a qualitative study like this, broad statements are not helpful, but the juicy details are valuable. For example, if a participant mentioned that "it is difficult to exercise at the gym as a type 1 diabetic", I would follow up by asking "In what ways is it difficult? Could you please elaborate on that thought some more?" Even though my interview with Dr. Li went well, she wanted us to take one more step before calling the interview guide complete.

Dr. Li wanted me to test out the interview guide with another interviewee before using it for the study. Due to the limited pool of participants at WWU, we didn't want to waste one of our potential participants on a practice interview. Fortunately, I interviewed my type 1 diabetic cousin, who I referenced earlier. The interview went smoothly, so Dr. Li then gave me the green light to proceed to other IRB application submission steps

I certainly underestimated the number of revisions and amount of time required to construct an effective interview guide. I also underestimated the amount of work required to submit an application to the WWU IRB. The IRB approval process was a completely new learning experience for me, yet it was fascinating. I started filling out the IRB application, writing up a CDN club announcement script, and constructing a consent form. I got tips on the application throughout the process by helpful communication with a WWU Research Compliance Officer. She advised me on data security and confidentiality protocols as well as other factors. Fortunately, I used a helpful informed consent template from the WWU Research Compliance website as the foundation, but the process was extensive. Dr. Li was helpful for indicating that certain sections of the form were irrelevant for our study and many sections could be shortened for clarity and ease of reading. It was amazing how much we cut out from the original draft. It is worth noting that throughout this entire process, I have benefitted greatly from collaborating with Dr. Li and other professionals with significant real-world experience conducting research. The club announcement was relatively straightforward but also underwent several revisions.

We eventually reached a point when we were comfortable enough with our application to finally submit it to the WWU IRB. Soon after submitting, we met with the Research Compliance Officer on Zoom. We systematically went through the application and supporting materials as

the officer suggested edits and revisions. Her suggestions were very helpful and made the study smoother, more understandable, and added greater privacy and security for participants. A suggestion that added tremendous ease to the study was to have an online informed consent agreement. We ended up adding the informed consent form to Qualtrics and included an extra question about preferred day/time for an interview. This made the interview scheduling process easier. Dr. Li and I finished the edits while communicating back and forth after the meeting, and then we resubmitted.

Our application was accepted in late January! Upon the approval notification, I felt a boost in my energy and motivation to complete the project. Much like the literature review, the IRB application process dragged on and felt discouraging at times. At that moment, I took a step back to reflect on all the work we had done to reach this point. This positive news boosted my confidence and energized me for the next stage: recruitment and interviews.

Recruitment and Interviews

Although I am an introvert, I greatly enjoy connecting with people and sharing opportunities with others. Therefore, I was quite excited and confident about the recruitment phase! At the first CDN meeting following the IRB approval, I gave a scripted announcement about my study. I was thrilled to discover how many people were intrigued by my topic. With the in-person announcement and email announcements on the club list-serve, I started receiving Qualtrics responses, which indicated that people had agreed to the informed consent, and they wanted to set up interviews. I attended a few more club meetings to announce my study, and I enjoyed it each time. It was fun to share this genuinely beneficial opportunity with the type 1 diabetic student community, and I loved the human interaction of it. After a full year of remote schooling, it was wonderful to speak face-to-face with my peers.

I started conducting interviews in early February. It is worth noting that 7 out of the 10 final participants used she/her/hers pronouns, so well over half of the data is from individuals who identify in this way. In addition, 6 out of 10 started attending Western before the pandemic, while the other 4 started attending Western after the pandemic began. All participants were either current students or recent graduates, with fall 2020 as the earliest graduation time to be eligible for the study. With that said, only two participants were not current students- one of whom graduated in spring 2021, and the other in summer 2021. The participants had a diverse range of majors as well as dates/ages of type 1 diagnosis, although all participants were diagnosed before or during the elementary or middle school years. All interviews were completed via Zoom with the transcription recording feature enabled. Before the first interview, I had a quick briefing with Dr. Li in which she stressed the importance of making each participant feel comfortable. A key strategy to promote comfort was asking each participant basic questions at the beginning of the interview. These prompts were simple to answer and often sparked light discussion. Some examples included “What is your current class standing?” and “What is your major?”. I felt well-prepared for these interviews after my practice with Dr. Li and interviewing my cousin. Hence, from the very first interview, I felt comfortable and enjoyed the process. At first, I had to consciously think about asking all the questions on the interview guide, listening to the responses, and asking effective probing and follow-up questions. However, over time, my tasks during the interview became fluid and automatic. It also helped that I reflected after each interview on areas in which I could improve my interview skills. Some points I noted were goals to reduce my use of filler words, being smoother with asking questions, politely interjecting

when the participant strays off topic, asking succinct probing questions when the participant does not offer an answer with juicy details, not asking certain sub-questions if they already thoroughly addressed them in their response to the main question, and paying more attention to each participant instead of the interview guide on Word.

The greatest challenge of the interview process for me was being frustrated when a participant would cancel last-minute or not show up. It was annoying, but I recognized that each participant is volunteering their valuable time, and there is no obligation to participate in my study. After taking some deep breaths, I recognized this challenge as part of the process and not due to a personal failure or mistake. Fortunately, most people who had to cancel a Zoom interview were able to complete one at a later time.

The aspect of interviewing that I enjoyed the most was connecting to the unique human experience of each participant. I thought deeply after some interviews about the Honors College first-year sequence during which we focused on learning about the human experience by reading classic literature from Cicero, Montaigne, Adam Smith, Thomas Hobbes, Homer, and others. By learning about the rich human experiences of the study participants, I couldn't help but connect it to my fist-year coursework which focused on justice, fate, duty, equity, leadership, unity, education, social customs, honor, health & the pursuit of happiness, and friendship among other themes. I felt deeply privileged that the participants shared their personal challenges and successes of living with type 1 diabetes. My peers expressed crucial and intimate details about their life including mental health difficulties, weight issues, poor health habits, success of improving diabetes control, and challenges with university resources. It felt amazing to empathetically connect on a human-to-human level during these interviews. These experiences inspire and motivate me to continue my path to become a physician. I cannot wait to connect with each patient in a similar way by exercising empathy and curiosity to appreciate their life experiences and personal story. I believe that connecting with patients on a human-to-human level will help make me an effective physician who treats each patient in a personalized way. I will be sure to account for each patient's unique background, personality, and life experiences when developing plans to improve health.

I began transcribing interviews before all ten were completed. I had no idea that it would be such a long, and at times, arduous process. During the interviews, I turned on the Zoom transcription feature. Therefore, after each Zoom interview, I was given a base transcription. These transcriptions were better than nothing but far from perfect. Zoom tried its best but had issues with certain words and with mumbling. I have developed an appreciation for clear speech, free from mumbling. Therefore, I took each Zoom transcription, pasted each into a Word document, and manually edited each one while listening to the original recording. It took longer than three hours to transcribe most interviews, which were usually 30-45 minutes recordings. Another big takeaway from transcription editing was the huge number of filler words in our speech. I was embarrassed by hearing the large number of filler words I use in my typical speech. I would not have noticed this if I had not spent close to forty hours diligently transcribing ten interviews. During this transcription process, much of which took place during spring break, I realized the importance of clear, coherent speech as a future physician. I want to ensure my patients easily understand what I am saying so my speech is not a barrier to providing effective care. It is through projects like these that inspire me to pay greater attention to my speech habits and look for ways to improve. As a future physician, at the very least, it will be important to avoid mumbling.

Analysis

Once all interviews and transcripts were complete, it was finally time to analyze our hard-earned data by coding the interviews for themes. Dr. Li and I separately coded two different interviews that we thought covered an especially large range of themes. In the coding process, we placed key words next to passages of each interview that we thought encapsulated the ideas of that passage. After we completed the initial coding, we met to see where our coding agreed and where it did not. Surprisingly, much of our coding did align, although we did have differences for some interview sections. It was interesting to discuss and debate which coding words should be used for certain passages, messages, and themes we encountered. I usually selected more specific themes while Dr. Li chose broader ones. I learned that for this process, it is better to go broad and then ultimately have several sub-categories for a broad theme like "challenges". We worked through our coding differences to create a standardized codebook, which we used to code the rest of the interviews.

It was important for each of us to separately code all the interviews to keep the analysis objective. After each of us coded all ten interviews, I highlighted the main areas we differed in our coding. We discussed our differences and eventually agreed on coding for all the key passages. Then, I wrote up theme statements that encapsulate the main themes we observed. It felt fulfilling to write up these themes because they will be the major takeaways from the study. Some of the theme statements contained multiple codes that combined nicely into one coherent theme. It was a wonderful feeling after we edited the themes together and Dr. Li told me I was now clear to start writing up my final paper and presentation slides!

Results and Discussion

We identified seven key themes. Theme 1 is: **Type 1 diabetes impacts the lives of college students in numerous ways, which include impact on social life, impact on academics, impact on lifestyle choices, impact on life transitions, and limiting career choices**. Participant 8 described how type 1 diabetes limited her career options.

"Yeah, it's kind of, so a while back like in high school, I remember talking to some army recruiters, and I remember I was asking them questions like, what can I possibly do? And I was like talking about jobs and potential things to do in the army, and I remember they were asking me, you know, telling me all this information. I was like, oh, by the way, I'm a type one diabetic. Dead silence on the other line." [Participant 8]

Besides limitations, the impact of diabetes on social life was commonly discussed. Participant 7 shared an experience that illustrates the way diabetes can get in the way of living a "normal" college life.

"I mean you know there's always going to be moments where it's like you go out and like want to, you have a pizza with your friends, and then like your blood sugar is like horrific afterwards, and you're like, well, I just want to have a slice of pizza with my friends, and like I'm being punished for doing like normal college kid things," [Participant 7]

This passage relates to the concept of "tension" between being a type 1 diabetic and a normal college student (Balfe, 2009; Hill et al., 2013).

Another impact of type 1 diabetes worth noting is on lifestyle. Hypoglycemia can be quite disruptive, and participant 5 mentions how it can negatively impact his exercise practices.

"Even when I turn off like my insulin, even when I like eat snacks before, my blood sugar still goes low. Very frustrating, very annoying to cut the workout midway, just because your blood sugar goes low." [Participant 5]

Hypoglycemia can clearly be disruptive to one's lifestyle. This quote also reflects the message in the literature that hypoglycemia is an ever-present concern that type 1 diabetics always must consider (Hill et al., 2013; Sato et al., 2003; Widowik et al., 1997; Wilson, 2010).

Theme 2 is: **College students with type 1 diabetes must face unique challenges which include diabetes management challenges, healthcare challenges, and academic challenges**. Participant 10 gave a great example of the challenges of diabetes management:
"I have like a lot more trouble with lows now than I used to, and I did try adjusting my Lantus, which, or Tresiba, I don't know, I use Tresiba now, but I still call it Lantus, to like try to fix that, and then it made it 10 times worse. I was just super high, so I fixed it back, and now it's still just low when I walk." [Participant 10]

Participant 6 also did an excellent job of describing the challenging and complex nature of diabetes management by highlighting the many different tools to keep track of and use effectively. This passage also relates to the healthcare challenges this population faces.

"There's so many different aspects to it like you have, if you're dealing with a CGM, you're dealing with one company and your insurance. If you have a pump, you're dealing with a probably another company, also dealing with your insurance. For both of those things, you need prescriptions. Then, you also have to get insulin. Then you also have to like, test your blood sugar, which also requires lancets. All of those things need prescriptions, and, like, you need a doctor…" [Participant 6]

This burden and challenge of diabetes management emphasized above by participant 10 and participant 6 is echoed by the words of participant 8:

"I guess maintaining like a work-life balance is pretty difficult, just because there is no day off really. It's just something constant that you obviously need to take care of yourself, or you might die." [Participant 8]

These thoughts by participant 8 also relate strongly to theme 1, which concerns the impact of type 1 diabetes on one's life. Nevertheless, the message of never having a day off, explained by participant 8, is connected to the complex, challenging nature of diabetes management that participant 6 and participant 10 address above. The burden of constantly monitoring diabetes

every day was a common theme also present in the literature (Ramchandani et al., 2019; Saylor et al., 2019)

Expanding on the thoughts above by participant 6, healthcare challenges were quite common with many other participants. For instance, participants frequently mentioned the lack of quality endocrinology care in Bellingham, Washington, the town where WWU is located. It was interesting to note the significant prevalence of healthcare challenges in the present study because this was not a topic of great focus within the literature concerning college students with type 1 diabetes. Participant 9 describes her experience having to drive several hours to Tacoma, Washington to receive diabetes care.

"But then the only in-network doctors were in Tacoma, so I would every 3 months at least, I would have to go, and I don't drive for other reasons. But as I would like bus down to Tacoma every 3 months to get to that Doctor's appointment, that was super, you know, hard to go. Yeah, the endocrinology scene in Bellingham is quite lacking." [Participant 9]

In addition to healthcare challenges, academic challenges were also a common concern. Hill and colleagues (2013) discussed how the blood sugar fluctuations can negatively impact academic performance. In addition, the authors mentioned that academics can also sometimes get in the way of proper diabetes management. Participant 10 described a difficult situation in class that also relates to the disruptive nature of hypoglycemia, which type 1 diabetics must constantly monitor.

"I don't want to leave and miss out on instruction just because I'm low and eat a granola bar, and then just like disrupt class. So, I usually tend not to and I'm just sitting there like, oh, gosh, I feel so bad. Just not the best {thing}. I did that today. But then I'll walk out eventually if it gets too bad and I'll take a granola bar. But I think that would probably be another thing if I go low, I don't, I won't leave till I absolutely need to." [Participant 10]

This passage relates to the ideas addressed by Hill et al. (2013) by mentioning the disruptive nature of dysregulated blood glucose levels on academics, as the participant felt "bad" in class. In addition, the participant describes how academics got in the way of proper diabetes management because they remained in class even when they knew they had hypoglycemia they needed to treat.

Participant 2 shared similar concerns about hypoglycemia in class, but actually mentioned a benefit of online classes for glycemic control.

"If you're on Zoom you don't have to, you can like, be more, more like aggressive with your corrections and stuff because you know you're just like, in a safe place, you're not in, I don't know, just for my own thing I am always anxious to go low in class outside, but I'll be less over Zoom." [Participant 2]

By being in a safe, at-home environment, participant 2 can take more insulin than he would feel comfortable taking in a traditional class to correct hyperglycemia. This is one benefit of the

COVID-19 pandemic; however, as discussed below, the pandemic had significant negative effects on this population.

Theme 3 is: **The COIVD-19 pandemic has impacted students like everyone else, but type 1 diabetic students feel a sense of vulnerability due to their condition**. Participant 6 certainly pointed out feelings of vulnerability

"I haven't had covid but if I did get it, I mean I'm vaccinated, but even if I still got it, it's probably gonna be worse for me than it is for my classmates or the people in my internship." [Participant 6]

Participant 6 certainly has good reason to feel vulnerable because type 1 diabetics have notable risk of developing diabetic ketoacidosis (DKA) when infected with COVID-19 (Chowdhury & Goswami, 2020). DKA is a potential COVID-19 complication that non-diabetic members of the population do not need to worry about.

Participants also described a noteworthy common phenomenon during the pandemic lockdowns. They had high blood sugar due to sedentary behavior promoted by these lockdowns. With regards to challenges from the COVID-19 pandemic, participant 1 described that "The biggest issue was the sedentary lifestyle that it forced us to live. That was so incredibly hard for me because anything I ate; my blood sugar would rise. Anything I ate, so that especially that spring quarter was so difficult to do any sort of classes and focus when your blood sugar's just 300. And I mean, I was sedentary, but I didn't even think about this until now but all the added stress I mean stress does interesting stuff to your blood sugar as well so like, all that stuff was so difficult to then complete classes as well." Many other students had a similar experience of sedentary behavior leading to consequences during lockdowns, so I think this was the biggest takeaway from the influence of the pandemic on the experience of college students with type 1 diabetes. The literature helps support this phenomenon. Although the participants studied by Tornese and colleagues (2020) improved their glycemic control during COVID-19 lockdowns, a major influencing factor was engaging in regular physical activity. Because the participants in the present study largely lacked proper physical activity, it makes sense why the COVID-19 lockdowns had a detrimental effect on glycemic control.

Theme 4 is**: College students with type 1 diabetes use certain management strategies to deal with their condition, such as nutrition and exercise regimens**. Many of the participants described the importance of exercise and proper nutrition for management, regardless of the changes that the pandemic brought. Participant 3 explained the importance of exercise as part of diabetes management, which connects to the positive benefits of exercise studied by Tornese et al. (2020).

"Sometimes if like my blood sugar's high, and it like won't come down, I'll just go like, there's a lot of stairs here and just go up and down the stairs and then it goes down, which has been nice." [Participant 3]

Theme 5 relates to support: **To help cope with their condition, college students with type 1 diabetes receive physical and/or emotional support from friends, family, roommates/housemates, and the CDN club which can provide a sense of belonging**. This

theme strongly aligns with existing literature that expresses the positive benefits of support for type 1 diabetics (Edwards et al., 2014; Ersig et al., 2019; Fedor et al., 2017; Fredette et al., 2016; Habenicht et al., 2021; Helgesen et al., 2014; Johnson, 2020; Saylor et al., 2018a; Saylor et al., 2018b; Tang et al., 2013; Walker et al., 2020; Widowik et al., 1997). The community these students build with the CDN club relates to the individual and the community discussion in my honors college first-year courses. Here we see how these individuals find great value in support from their community. In addition to the community supporting them, these individuals also participate in the community to make it stronger. Participant 3, who is part of the CDN club, described an example of a supportive connection they have with participant 2, who is also part of the club.

[3] "(Participant 2) and I like live on the same floor. So, like to know that he's like that close and like, like when we can just like text each other and like meet in the hallway and like talk about anything and really help each other with anything, that's been really really nice." [Participant 3]

Participant 6 also describes the great importance of support from friends:

"I have a close friend with diabetes that I met at Western, and sometimes I'll text, and I'll be like I'm super low, I feel like trash, or they'll text me and they'll be like, yeah, the other day they were like, I'm 319. I can't go to bed. And so, in terms of strategies, it's find yourself a diabetic friend." [Participant 6]

Theme 6 states that: **The availability of diabetes technology is very helpful for college students with type 1 diabetes**. Participant 7 mentioned the great value from using the t:slim pump device with Control IQ.

"So that's made like a massive difference in my diabetes care like my blood sugar is just now a lot better and less like yo-yoing like I was saying before and just makes it easier for me, like I just get to be a little bit more hands-off of it too, just like a tiny bit, but that makes like the world's difference," [Participant 7]

The greater ease that comes from using diabetes technology, which participant 7 expressed, is supported by Ramchandani and colleagues (2019). They explained that in the majority of cases, diabetes technology, such as insulin pumps and continuous glucose monitors (CGMs), made diabetes care easier.

Theme 7, the final theme, pertains to the role of the university: **The university influenced the lives of college students with type 1 diabetes through academic requirements, accommodation services, faculty awareness, student health services, and dining services. With that said, the students do not think the school can do much to support them.** A particular area that participants thought needed improvement was the dining services. Participant 2 described the influence of the dining hall:

"Yeah, I had to kind of modify my diet around the dining hall for sure. Cuz it's very carby food, so just like eating low carb stuff is, I always find, you know, results in better control but it's sometimes it's hard to do at the dining hall." [Participant 2]

Participant 8 described similar struggles with dining services:

"Because I remember for a while, the only thing I could eat there was like from the salad bar and that's like, you can't just purely live off of salad, you know what I mean." [Participant 8]

Reflection on Findings and Suggestions to Universities

Based on these themes, there are clear challenges that students with type 1 diabetes experience at Western, and there are some changes at the university that could potentially help this population. This discussion relates to the individual and the community relationship I referenced above, which I explored in the Honors first-year coursework in different cultural contexts across human history. In healthy societies, this relationship is strong, in which individuals feel a sense of duty to serve their community and the community supports the health and pursuit of happiness for all the induvial that comprise it. This is a fragile relationship and one that must be carefully monitored to preserve the health of all individuals in the larger society. At WWU, we could improve this relationship between type 1 students and the institution. To help support the unique human experiences of type 1 students, the university community must adapt and respond to these individuals, who help contribute to the diversity and overall strength of the university. Many participants expressed struggles with the very high-carb food at the dining hall. Therefore, it could be incredibly beneficial to provide more dietary options at the dining hall that are lower-carbohydrate and still nutritionally dense. Fedor et al. (2017) also identified high-carbohydrate food at campus dining halls to be a hindrance to blood glucose control.

Participants in the present study also expressed a desire for the student health center to be more knowledgeable about type 1 diabetes and provide more effective, informed care. This aligns with literature that emphasizes the issue students have experienced that student health services staff lack awareness about type 1 diabetes (Fedor et al., 2017). Therefore, perhaps extra training on type 1 diabetes for student health center workers could be beneficial. Along this line of thought, participant 8 expressed that "…even more resources to the Student Health Center and be, like, maybe bring in some diabetes educators or nutritionists, or whatever might be helpful honestly, because not every doctor is well equipped to handle diabetes because of how, because it's unique in a lot of ways. So, I think that would be helpful." These critiques of university services align with the message in the literature such that imperfections in these services can sometimes hinder the college experience for type 1 students (Ersig et al., 2019; Fedor et al., 2017; Hill et al., 2013; Widowik et al., 1997).

In addition to improvements to dining and health services, the university community could better support type 1 students if there was greater understanding and awareness in the community about the experience of these students. There is a certain amount of misinformation and misunderstanding of type 1 diabetics at Western, which was echoed in previous studies that emphasized that lack of diabetes awareness in the university environment can make students not feel supported (Hill et al., 2013; Wilson, 2010). Participant 1 expressed frustration when reflecting on interactions with members of the community: "Oh my god, I cannot tell you how many grandmas I've heard have diabetes, how many grandmas. How many cats and how many dogs have diabetes." A lot of current issues and challenges facing type 1 diabetics at universities could be improved or solved by developing greater understanding throughout the community. If we can understand the human experience of our fellow individuals better, we can create a

community that better serves the unique needs of each individual. Therefore, a major goal of this project is to spread greater awareness about the unique experiences of these individuals in efforts to develop better understanding throughout the community. I sincerely hope that the information from this study can foster greater understanding of this specific population and lead to the development of policies and services at university that can improve the college experience for these individuals.

Personal Reflection and Advice for Future Students

As I reflect on the major takeaways from this study, I am reminded of the major burden type 1 diabetes can have on one's life. I have lived with type 1 diabetes for over 6 years, and it is easy for me to forget how challenging it is. I am fortunate that I have developed health practices that keep my diabetes well controlled. Nevertheless, when I take a step back and examine the experiences of my diabetic peers, I am remined of the huge impact diabetes has on my day-to-day life. For me, the daily practices and protocols have become routine and automatic, such as giving injections, monitoring blood sugar at the gym, and treating unexpected hypoglycemia. Conducting this project has pushed me toward being more conscious of my medical condition. This is not a bad thing because it helps me appreciate all that I do each day to take care of myself, out of self-care and self-love. I desire to live a long, healthy, happy life, so being mindful of my diabetes management is critical for fulfilling my life goals.

I hope this paper can be a helpful resource for future students interested in conducting a qualitative public health project. As I reflect on the entirety of this project, I have advice to share and lessons I learned that will be helpful as a future physician. Overall, this project was a big learning experience at every step of the process. I learned how qualitative research is conducted from start to finish. The IRB approval process was especially interesting. I realized the process was so rigorous because of the importance of ethics, such as protecting each participant's data and security.

Based on my overall reflections, there are a number of pieces of advice I recommend for future students. First, I greatly encourage you to do this kind of project because it gives you a greater appreciation for the scientific method, by conducting a study from conception to completion. If you choose to conduct this type of study, please know that it is long and at times quite challenging. Therefore, keep your head up and focus on one step at a time while also keeping a general timeline and plan with your advisor. In addition to having a general timeline for the big picture of the topic, it is critical to meet regularly with your advisory. This will help you stay on track and maintain clear communication. I had a meeting with Dr. Li roughly every two weeks, and these are great times to lean on your advisor for advice to improve your work on steps throughout the process. Your advisor has helpful insights to offer which will prove to be invaluable throughout the project. They are the expert, so take advantage of this opportunity to work with a PhD in the field. Your advisor likely has vast research experience, so learning from them through your collaboration will help you better understand how the scientific process works. My last piece of advice is to not take yourself or your study too seriously. Have fun with it! Be open and flexible because several aspects of it will not likely go perfectly according to plan, but that's just life.

I learned some valuable lessons from this project, and some of which apply well to my future role as a physician. Above all else, I learned to not mumble! Transcribing ten interviews helped me develop an appreciation for clear speech that is easy to comprehend. I found that I was

just as guilty of it as participants were. Besides learning not to mumble, this project has helped me better understand the human experience. Even though I am a member of the type 1 student community, by conducting these interviews I better recognize that being a human is difficult and being a human with a chronic medical condition adds another layer of difficulty. I greatly appreciate the opportunity to learn more about the complex lives of my peers and understanding them better as human beings with challenges and successes. I found value in authentically connecting in an empathetic way. This will be an important skill as a future physician connecting with patients. As a future physician, it will be important to learn about the other areas of patients' lives not directly related to their health because I have found from this project that considering the whole person is valuable. As humans, we are complex creature with unique life experiences. Therefore, understanding my patients' lives at a deeper level will help me provide more effective, personalized care. The final lesson I learned was about myself in that I truly enjoy interacting with my fellow humans. I enjoyed the interviews and loved connecting with my peers, which I take as a good sign that I will enjoy a career as a primary care physician. Although I consider myself an introvert, I get a lot out of meaningful social interaction.

Future Steps and a Message of Gratitude

In the future, I would love to write up a full, formal scientific paper and submit it for publication in a peer-reviewed journal. That will be an extensive process. Nevertheless, soon I will maybe be able to present my findings to a formal public health scientific audience since I submitted an abstract to the American Public Health Association annual conference. If my abstract is accepted, I will travel to Boston in November to present my findings.

This project would not have been a success without the help from my amazing advisor Dr. Li, the willingness of members of the CDN club to participate, and the helpful input from the WWU Research Compliance Office. Furthermore, I am grateful for the Honors College providing me with the opportunity to explore a key area of interest during my senior year, and I am thankful for the advice from Dr. Tristan Goldman and Dr. Scott Linneman throughout this process. Lastly, I am grateful for the support and encouragement from my friends and family which has helped me greatly throughout the highs and lows of this project.

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