

COVID-19 SPECIAL COLLECTION

RESEARCH ARTICLE

Impact of preferred learning style on personal resilience strategies among pharmacy students during the COVID-19 pandemic

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Abstract

Introduction: Using COVID-19 as the context, this study explored how differences in individual learning styles impacted personal resilience strategies among pharmacy students. This is a uniquely stressful period of time for many learners; pharmacy education has shifted predominantly to novel online forms of teaching, learning, and assessment, and traditional psycho-social support became difficult to access due to lock-down and quarantine requirements. **Methods:** Data were gathered throughout May and June 2020 via participant-observer, semi-structured interviews. Data analysis was performed using deductive analysis techniques, based on existing themes in resilience research. **Results:** A total of 21 pharmacy students were interviewed, the majority of whom had 'Assimilator' or 'Converger' dominant learning styles as classified by Austin's Pharmacists' Inventory of Learning Styles (PILS). Assimilators had a stronger sense of professional identity, practiced positive psychology, and utilised journaling as resilience strategies more frequently than Convergents. Convergents were found to be more self-efficacious and adaptable than Assimilators. **Conclusions:** Rather than providing 'one-size-fits-all' advice and programming to pharmacy students, there may be potential to improve resilience by incorporating tailored and specific strategies based on the dominant learning style of each individual student.

Introduction

On any typical day, Canadian pharmacy students must manage a number of stressors, including rigorous academic demands, time management, financial burdens, personal and professional relationships, fear of failure, and exposure to death of patients while on rotations (Beck *et al.*, 1997; Brougham *et al.*, 2009; Miller *et al.*, 2018; Schommer *et al.*, 2020). In March of 2020, the lives of pharmacy students in Canada were far from typical as the COVID-19 pandemic forced many workplaces and institutions across the country - including universities - to migrate to virtual/online platforms. Consequently, pharmacy students across the country grappled with sudden and dramatic changes to their personal, professional, and academic lives. Anec-

dotally, whilst some students were overwhelmed by these changes, others quickly landed on their feet and seemed to be able to thrive in this new environment. Pharmacy students - like all citizens - responded differently to changes that occurred in the early stages of the pandemic; while some may not have experienced any impactful stress during this time, for others there may have been a need for significant psycho-social adaptation and capacity for self-management strategies.

This stark difference in response may, in part, be attributed to resilience, defined as 'a dynamic process encompassing positive adaptation within the context of significant adversity' (Robertson *et al.*, 2016). Those that are highly resi-

lient have the capacity to respond productively and positively in order to adapt to changing, and at times unexpected, circumstances and stressors (Cherniss *et al.*, 2001; Stevenson *et al.*, 2011). Resilience has been cited as a vital skill for new graduates, especially in psychologically and emotionally demanding fields such as healthcare, which have higher than average levels of stress and burnout (Stamm, 2010; Aburn *et al.*, 2016; Tomlinson, 2017). Research suggests that healthcare workers, such as pharmacists, are at higher risk of mental health issues and suicide compared to the general population (Roberts, Jaremin, & Lloyd, 2013; Zwack & Schweitzer, 2013; Guille *et al.*, 2015). There is a need, therefore, to proactively develop environments that foster resilience-building which will allow students to learn ways of coping with adversity and imbue students with a sense of confidence and competence when managing stressors in the present situation, and throughout their careers (McCann *et al.*, 2013; Kang *et al.*, 2019).

Currently there is a paucity of literature examining effectiveness of resilience building strategies in pharmacy students. Moreover, much of the existing literature provides 'one-size-fits-all' suggestions for resilience building, and it is unlikely all strategies will work uniformly for all pharmacy students (Austin, 2020). One potential lens through which to view and understand differences in inter-individual resilience strategies is learning styles theory.

Learning styles have been categorised using numerous methods, and can be described as 'characteristic cognitive, affective, and psychosocial behaviours that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment' (Keefe, 1987). One commonly used method of classifying learning styles is Kolb's Learning Style Inventory, which consists of four dominant learning styles: 'Assimilators', 'Convergers', 'Accommodators', and 'Divergers' (Appendix A; Kolb, 1985). Using Kolb's Model, Austin developed the Pharmacists' Inventory of Learning Styles (PILS), a validated tool specific to the profession of pharmacy (Austin, 2003; Austin, 2004). There is no current literature examining application of learning styles' theory to resilience, in the context of health professions or of pharmacy education.

Research objective

In an attempt to understand why certain resilience strategies are helpful for some individuals and unhelpful for others, this study sought to examine whether an individual pharmacy student's learning style was connected to or associated with preferred resilience strategies. Multiple studies across North American pharmacy schools have

examined the relationship between pharmacy students' learning styles and various outcomes. Using the COVID-19 pandemic as the social context, this study aimed to explore how differences in individual learning styles impacted personal resilience strategies among pharmacy students during a unique time of extraordinary social, personal, and professional stress.

Study context

This study was undertaken at the Leslie Dan Faculty of Pharmacy at the University of Toronto, Canada's largest pharmacy school, ranked number four globally in the QS World University Rankings (2019). Academic programmes include the entry-to-practice Pharmacy Diploma (Pharm.D.) degree (with approximately 1,000 students enrolled over four academic years), and graduate level Master of Science (MSc.) and Philosophy Doctorate (Ph.D.) degree programmes (with approximately 200 students). The Pharm.D. programme consists of three full-time university-based years, followed by a year of hospital and community-based clinical rotations (Advanced Pharmacy Practice Experiences) designed to consolidate theoretical knowledge and practice-based skills prior to completion of the degree. As of 13th March 2020, all university-based lectures were cancelled and teaching, learning and assessment were immediately shifted to online delivery modes, and all clinical rotations were suspended. Recognising the extraordinary nature of the pandemic, degree requirements for clinical rotations were modified, allowing all students who were unable to complete rotations due to the pandemic to graduate with the Pharm.D. degree, even if they had not completed all clinical rotations.

The academic year for the University of Toronto runs from early September to late April. Traditionally lectures and laboratory courses end in early April, with final examinations scheduled for the last two to three weeks of April. With the COVID-19 shutdown of 13th March 2020, the final three to four weeks of lectures and laboratories, and all final examinations and assessments, had to be immediately shifted to online delivery. Prior to 13th March 2020, only minimal components of the Pharm.D. degree programme were delivered online; neither faculty nor students had appreciable experience with this form of education. Furthermore, there was minimal administrative support or infrastructure to assist the 1,000 students and dozens of faculty members attempting to navigate this unplanned and rapid change of circumstance.

Methods

This study was exploratory in its orientation. The study received Research Ethics Board Approval at the University of Toronto. No funding for this study was received or

used, and participants in this study received no compensation or honorarium for their involvement.

Participants

Participants were recruited to the study using multiple methods. Initially, students were identified by sharing recruitment information on Facebook groups for each of the four academic years of the Pharm.D. programme who were active at the University of Toronto during the Winter 2020 semester. Once participants were recruited from each cohort, snowball sampling was used to identify and recruit additional students who were interested in participating. Several weeks into the study, one additional call for participants was posted in class Facebook groups with the goal of recruiting participants with learning styles that were underrepresented in the study. Following recruitment and completion of consent processes, participants completed the validated PILS tool to assess personal learning style prior to participation in the interview.

Interview protocol

A qualitative one-on-one semi-structured interview format was identified as being optimal for gathering data and stories from participants, as a way of gaining a deeper and more personalised understanding of coping/ adaptation strategies used by pharmacy students during the COVID-19 pandemic. The pandemic served as a uniquely impactful context to study real-world adaptation strategies undertaken by pharmacy students in both their academic and personal lives, and provided researchers with an opportunity to leverage participants' lived experiences of the early months of lockdown and change as a rich context for exploring broader themes associated with resilience. As there was no previous research to guide this study, the interview protocol was developed specifically for this study and this study context. As interview guide questions were developed, pilot testing was undertaken through trial interviews to ensure clarity and comprehensibility of questions, and that the interview protocol itself aligned with study objectives. After three pilot interviews and refinement of the interview guide, a finalised interview protocol was created (Appendix 2).

Data collection, management and analysis

Due to lockdown conditions and social isolation requirements in effect at the time of this study, live in-person interviews with participants were not possible. Interviews were instead conducted using Zoom video calling and were recorded with participant consent. Real-time field notes were also gathered by the interviewer throughout each call to add additional context to the interview tran-

scripts. Verbatim interview transcripts were produced using Otter transcription services (a semi-automated online tool available at www.otter.ai) and were subsequently verified and corrected by manually reading the transcript alongside the audio recording to ensure accuracy. Transcripts were then coded using deductive analysis techniques. All data were stored in a secure, password protected Google Drive electronic file.

A theoretical framework was used to guide initial data analysis and coding. This framework was derived from key elements of the established resilience literature in pharmacy and health professions education. The framework consisted of both traits and activities associated with higher levels of resilience amongst students and practitioners. Specific personal psychological traits identified in this literature that support enhanced resilience include: a) strength of professional self-identity; b) individual's perceived self-efficacy; c) capacity for adaptation/adaptability, and a positive psychology (sometimes referred to as 'grit'), while specific resilience-enhancing activities included d) engaging in physical activity; e) social connection; f) journaling and g) mindfulness/meditation and therapy (McCann *et al.*, 2013; Fares *et al.*, 2016; Stoffel & Cain, 2018; Austin, 2020; Witry, Logan, & Ray, 2020). These specific traits and activities formed the initial coding structure through which interview data were analysed. Coding was completed in real-time following each interview to inform subsequent interviews. Interviews continued until clear trends began to emerge within each theme, data saturation was reached, and no new perspectives were encountered.

Reflexivity

This study may be categorised as participant-observer or peer-observer research. The primary researcher for this study (JP) was a fourth year pharmacy student who had already graduated with a Master of Science degree prior to enrolment in the Pharmacy Diploma (Pharm.D.) degree program. JP was himself a part of the part of the participant population being studied: his third year studies and final examinations were interrupted due to COVID-19 and fully migrated to online delivery, and his required clinical rotations for fourth year were suspended due to lockdown conditions. JP elected to undertake a ten-week immersive, virtual, non-patient care research project rotation with a senior researcher (ZA) as a way of compensating for the loss of clinical rotations that had been scheduled for this time. As a result, JP's personal experience - similar in nature to that of study participants - provided a unique foundation for both creation of the interview protocol and analysis and interpretation of the data collected.

Trustworthiness and indicativeness of data

Lincoln and Guba (1985) have described techniques for enhancing the quality and rigour of qualitative research. For this study, we employed several of these techniques, including: a) use of thick descriptions derived from an interview protocol focused on narrative and providing open-ended opportunities for participants to share their personal experiences; b) data triangulation across different participants who experienced the same situational and environmental conditions; c) theoretical triangulation through application of a literature-derived theoretical framework to guide preliminary data analysis and coding; d) validation of coding interpretation through second reading of transcripts to enhance reliability of interpretation; e) consistent application of reflexivity principles (of particular importance given the location of the principal researcher (JP) and the nature of participant-observer research such as this); f) use of a semi-structured protocol to provide both consistent structure to interviews but sufficient latitude to gather thick descriptions from participants; and g) use of a consistent, trained primary interviewer (JP) to minimise variability in data gathering conditions (Lincoln & Guba, 1985). While these techniques may enhance quality and rigour of the study, qualitative research such as this does not purport to be generalisable beyond the study context itself, nor does it aim to generate universal truths that are applicable in other situations (Lincoln & Guba, 1985).

This study received Ethics Review Board approval. No funding for this study was received or used, and participants in this study received no compensation or honorarium for their involvement.

Findings and Discussion

A total of 21 pharmacy students participated in the study (Table I). All participants agreed to recording and transcription of their interviews for the purpose of inclusion in the analysis. No participants dropped out of the study or requested for their data to be removed from the data pool. Interviews took approximately 40 minutes (on average) to complete.

Table I: Demographic information and learning styles of study participants

*BSc = Bachelor of Sciences; MSc = Master of Sciences

**The final letter of the participant code refers to dominant learning style as assessed by the Pharmacists' Inventory of Learning Styles: A = Assimilator, C = Converger, AC = co-dominant Assimilator/Converger

The vast majority of participants were either 'Assimilators', 'Convergers', or both, while two participants had a 'blen-

| Participant | Sex | Age | Prog. Year | Highest Degree* | Learning Style | Code** |
|-------------|-----|-----|------------|-----------------|-----------------------|------------|
| P1 | M | 25 | 3 | BSc | Assimilator | P1-Y3-A |
| P2 | M | 26 | 3 | MSc | Converger | P2-Y3-C |
| P3 | F | 24 | 3 | BSc | Converger | P3-Y3-C |
| P4 | M | 22 | 3 | N/A | Assimilator | P4-Y3-A |
| P5 | M | 24 | 4 | BSc | Converger | P5-Y3-C |
| P6 | F | 24 | 2 | BSc | Assimilator-Converger | P6-Y2-AC |
| P7 | M | 25 | 2 | MSc | Converger | P7-Y2-C |
| P8 | F | 25 | 3 | BSc | Assimilator | P8-Y3-A |
| P9 | M | 29 | 3 | MSc | Assimilator | P9-Y3-A |
| P10 | M | 24 | 1 | BSc | Assimilator | P10-Y1-A |
| P11 | F | 23 | 1 | BSc | Assimilator | P11-Y1-A |
| P12 | M | 21 | 1 | N/A | Assimilator-Converger | P12-Y1-AC |
| P13 | F | 24 | 2 | BSc | Assimilator | P13-Y2-A |
| P14 | F | 25 | 4 | BSc | Converger | P14-Y4-C |
| P15 | F | 22 | 3 | N/A | Blended | P15-Y3-B |
| P16 | F | 22 | 3 | N/A | Assimilator | P16-Y3-A |
| P17 | M | 25 | 4 | BSc | Blended | P17-Y4-B |
| P18 | F | 23 | 2 | BSc | Accommodator | P18-Y2-Acc |
| P19 | F | 26 | 4 | BSc | Converger | P19-Y4-C |
| P20 | F | 24 | 2 | BSc | Assimilator | P20-Y2-A |
| P21 | M | 25 | 3 | BSc | Converger | P21-Y3-C |

ded' learning style (i.e. even scores across all learning style categories), and one participant was identified as an Accommodator. This distribution is not surprising based on recent research conducted in different jurisdictions (Texas, Illinois, and British Columbia) demonstrating the proportion of pharmacy students who exhibit dominant Assimilator, Converger, or Assimilator-Converger learning styles may be as high 77–90% depending on the cohort (Crawford, Alhreish, & Popovich, 2012; Robles, Cox, & Seifert, 2012; Loewen, & Jelescu-Bodos, 2013). As a result, there is insufficient data to make any inferences regarding resilience strategies of individuals who are 'Accommodators', 'Divergers', or those who exhibited a 'blended' learning style. For this reason, the findings of this study are focused on resilience strategies of Assimilators and Convergers, who represent the majority of pharmacy students in North America.

Professional identity

Professional identity is defined as one's professional self-concept based on attributes, beliefs, values, motives, and experiences (Slay & Smith, 2011). Having a strong sense of professional identity and being able to find meaning in the day-to-day life within a profession is associated with strong personal resilience (McCann, et al, 2013). An individual

with a strong, internalised professional identity may have unique psychological and adaptive resources to allow them to more effectively manage environmental and occupational stress, through enhanced self-confidence, pride, or other mechanisms (Slay & Smith, 2011; McCann *et al.*, 2013). Professional identity formation, and self-identification as a professional, may enhance motivation for problem solving, improve perseverance in the face of challenging tasks, and improve interpersonal communication (Slay & Smith, 2011).

Those assessed with a dominant learning style of Assimilator in this study most frequently described feelings of pride and optimism when speaking about the profession of pharmacy and their place within it, suggestive of a strong sense of belonging to or association with the profession. In some cases, Assimilators wished they had more respect and appreciation from the public or other health-care professionals, but their optimism and commitment to pharmacy allowed them to persevere through difficult times - including the COVID-19 pandemic.

'I'm happy to be a part of this profession. And there's a lot for us to provide for the general public and our patients' ... 'I feel like with the pandemic, it's shown how capable we are with change and how we are able to take more responsibility if we need to. It's given me some more respect for the profession' [P1-Y3-A]

Convergers in this study also generally felt positively about the profession; however, unlike Assimilators, their positivity was not driven by pride in the profession as a whole. Instead, Convergers described a more utilitarian view of what pharmacy could do for them, highlighting flexibility in career paths that are available within the profession. Unlike Assimilators, the Convergers in this study, did not shy away from cynicism and criticism of their peers, as well as systemic issues within the profession.

'So the profession is kind of in a awkward place right now... from our perspective, it seems like pharmacy is going downhill, but I feel that that's just like any sort of medical profession in general. So, in fact, that's actually most professions now, people have a very narrow view of what's going on around them, they don't take a look at other professions. I think overall, if you kind of try hard and try to find your niche in the system, or for any professional even specifically, you can do very well in that.' [P21-Y3-C]

The resilience-building elements of professional identity appeared to manifest differently for Assimilators and Convergers in this study. Assimilators in this study relied more heavily on an idealised view of pharmacy as a helping pro-

fession with a strong social mandate, which in turn provided psychological reassurance that pandemic-related sacrifices and compromises were 'worth it'. By contrast, Convergers in this study viewed their professional identity in more self-interested terms, emphasising personal gains and benefits that current sacrifices would eventually produce. The different ways in which professional identity were interpreted in this study, based on different learning styles, requires further exploration to better understand how these differing constructs support personal resilience.

Self-efficacy

Self-efficacy relates to an individual's confidence in their ability to control their own motivation, behaviours, and social environment in order to achieve desired outcomes (Bandura, 1977; Bandura, 1994). Though related to the general construct of self-confidence, self-efficacy has a more psychological orientation, one focused on the construction of a personal identity aligned with competencies for navigating real-world challenges and opportunities (Bandura, 1994).

In this study, Assimilators demonstrated a high degree of variability in the ways in which they manifested or demonstrated self-efficacy. Learning styles theory predicts that Assimilators (in general) do not exude confidence and are frequently apt to confuse other people's confidence with competence (Austin, 2003). Few Assimilators in this study described themselves as confident or competent, and in fact the majority used language and tone that was suggestive of lack of self-efficacy. Those Assimilators that did exhibit signs of self-efficacy demonstrated this trait in the context of aspiring towards specific career goals

When asked if losing out on a hospital rotation due to COVID-19 would affect their ability to achieve a hospital residency, P8-Y3-A replied:

'I don't think so because I think I was already in a good place to get one. Personally, this is gonna' sound really cocky, but my experiences I think are better than most of the people in our class. I think just having that, that those few blocks at [hospital] were going to even solidify my chances even more, but I think I'm still in a good position.' [P8-Y3-A]

Conversely, Convergers as a group consistently demonstrated a high degree of self-efficacy, used language and tone consistent with an elevated sense of self-confidence, and expressed a high sense of self-worth.

'I think there's a good deal of flexibility with the profession, I think, depending on what you're interested in, there's a variety of different avenues that you can go into. And for me, I'm not as stressed or concerned because I feel the, you know, I feel like I'm in a good position in terms of employment in the future' [P5-Y3-C]

'Personally, for me, like, I already, I feel like I'm a little different, like, I already know my worth and I'm able to showcase what I think is my worth' ... 'my colleagues are not as strong or like as well versed in advocating for themselves or what they do, and I think that's just like a weakness in our profession because we're so used to being complacent.' [P19-Y4-C]

The connection between self-efficacy and resilience relates to the power of perseverance; individuals with high levels of self-efficacy have inherent belief in their capacity to solve problems and overcome obstacles, and as a result will demonstrate tenacity in the face of adversity (Slay, & Smith, 2011). Those with lower levels of self-efficacy may feel defeated before they even start to tackle a difficult situation. The differing ways in which self-efficacy manifested in Assimilators and Convergents in this study is important: for Convergents, self-efficacy appeared as a function of who they were as people (i.e. intrinsic self-efficacy), whereas for Assimilators, self-efficacy was a function of the fact they were part of a profession and had been admitted to a prestigious and competitive academic program (i.e. extrinsic self-efficacy). This points to a potential future threat for Assimilators (who comprise the plurality of pharmacy students); if economic prospects, prestige, or other external markers of 'success' of pharmacy as a profession change, will these Assimilators still demonstrate self-efficacy as a resilience- building element?

Positive psychology

Practicing positive psychology involves taking a realistic appraisal of one's situation and recognizing that things are rarely as bad as our minds imagine them to be (Austin, 2020). Sometimes referred to as 'grit', the ability to visualise positive outcomes in the midst of dire circumstances provides a form of psychological energy necessary to sustain resilience. In this study, Assimilators tended to use positive psychology techniques regularly; through deliberate effort, they remained by and large optimistic throughout the pandemic, and consciously worked to put things in perspective, and recognize things were not as bad as they may seem.

'Just putting things in perspective is really important to like, you know, like, this was so easy to get stressed dur-

ing exams and everything and then like, and I think the stress was really like real at times too. But I think at the same time, too, you know, like there's lots of other things that are going on for other people that you know, the situation isn't so bad for me as a student, like in a university with a profession that I've got something lined up if you weren't, didn't have their jobs, their lives are turned upside down.' [P9-Y3-A]

Convergents in this study did not commonly use positive psychology as a resilience strategy, and rarely if ever made a conscious effort to be optimistic. This may be due to Convergents exhibiting more robust self-efficacy; for them, there may be no need to be 'optimistic' because they already possess a level of self-assurance that they know how things will turn out. For example, one Convergent, when asked about their reaction to rotations continuing remotely, P2-Y3-C responded:

'My initial reaction was like, I don't think it's gonna work or I think a lot of people are gonna be screwed over, which was the reality of the case. A lot of people were screwed over. My internal reaction for myself was, you know, selfishly I just wanted to make sure that my rotation was okay.' [P2-Y3-C]

When asked about the most difficult aspect of the past few months, P7-Y2-C responded:

'I guess the most difficult thing is kind of understanding that things will never come back to normal. And that's kind of scary at the same time to think that because we've never been in a situation like this ever. And we're so used to the normal so we don't know what things will change once the situation gets a little bit better.' [P7-Y2-C]

The use of positive psychology and the trait of optimism appear to function differently for Assimilators and Convergents in this study. Further research is necessary to understand the importance of this difference and how it can be leveraged to support different kinds of students. For now, traditional attempts by well-meaning educators to use positive psychology methods may simply not be meaningful, and in fact may be greeted with cynicism, by some Convergent-dominant learners.

Adaptability

The ability to adapt to unanticipated or unpredictable circumstances is an important aspect in remaining resilient (Robertson, et al., 2013). The COVID-19 pandemic

provided an extraordinarily unique circumstance to examine adaptability of pharmacy students.

Convergers in this study demonstrated strong adaptability, often embracing change and making the most of the difficult situations they encountered. Convergers described themselves as focused on understanding and accepting the situation for what it was and finding ways to thrive throughout uncertain times such as the COVID-19 pandemic.

'There are those who are like, going through COVID, waiting for it to be over, and just like coping with it as they go through it, but there's also those people who just say that due to isolation, this is the way of life until it's changed. We don't really think about how... what life is gonna be like after until it's over rather than it's like how do I succeed. So my mindset through COVID-19 is very much like, oh, what can I do to make the best of this situation?' [P2-Y3-C]

Assimilators in this study demonstrated lower levels of adaptability Convergers. They described a strong need to rely on having a step-by-step plan in place and encountered practical and psychological difficulties when unpredictable circumstances arose. Some described a sense of paralysis if they did not have a clear 'roadmap' explaining what to do in any given situation. During the COVID-19 pandemic, strong Assimilators had particular difficulty adapting, and tended to adopt the (unrealistic) mindset of simply waiting for the pandemic to end so they could regain control

'I'm stuck with this situation just because the schedule changes means that things that I was planning for the whole year are now like, it's just up in the air now. Like the things that I planned aren't going to happen. How I laid out my schedule, that's not going to happen. My future rotations are up in the air too. Like I don't know what's gonna happen with them. So I think all this uncertainty is just stressing me out a lot.' [P4-Y3-A]

'I'm getting anxiety thinking about the fact that right now I'm not doing anything, but I'm gonna be even more stressed down the line. And there's nothing I can do about it, to make up for it, you know what I mean?' [P10-Y1-A]

The ability to be adaptable is of particular relevance to resiliency during the pandemic. The difficulties experienced by many Assimilators in this study and the unwillingness or inability to truly adapt to the realities of the 'new normal' suggests there are developmental and educational opportunities to support this group of learners.

Physical Activity

For both Assimilators and Convergers, physical activity/exercise was consistently described as a key resilience building activity. For Convergers in general, exercise was more pleasurable, easier into integrate into daily life, and simpler to organise. For Assimilators, many of them described not particularly enjoying exercise itself, but instead undertaking exercise because of the short- and long-term benefits on physical, emotional, and mental health.

'I feel like it is very effective. I personally don't love physical activity. You know, I do it for the sake of just for the sake of like my health, but like, I don't love it the way that many people do ... but it does work, it does like improve my overall mood' [P20-Y2-A]

'When I do exercise, I do feel really good and I can feel the difference in me when I do and don't but it's again one of those things that I guess I just haven't prioritised enough. I can't say I don't have the time because I use it for other things, but I need to work on prioritising it. And I've been saying I'll keep starting even throughout this quarantine, but I haven't.' [P13-Y2-A]

'I know that people [exercise] to destress. I don't think it helps too much with that aspect. More so that like, by doing physical exercise it makes me feel better about myself, and then that helps with my mental health. But like directly it won't affect my mental health.' [P19-Y4-C]

The kinds of physical activity undertaken by Assimilators in this study was typically different to Convergers. Assimilators in this study, tended to prefer less impactful, more solitary and less strenuous activities such as walking, yoga, or gentle cycling or swimming. Convergers tended to prefer more vigorous activities such as running or weight training. Prior to COVID, Convergers reported more involvement in team-based or competitive physical activities which were not possible during lockdown. Importantly, owing to both higher degrees of adaptability and self-efficacy, most Convergers in this study described their ability to pivot towards less preferred but still viable forms of physical activity, with little difficulty. Importantly, data related to physical activity in this study were somewhat insufficient to draw meaningful insights or conclusions regarding its role in adaptation and coping.

Social connection

Similar to physical activity, social connection and peer support were cited as important resilience techniques

regardless of dominant learning style. Social connection was described by all participants as being helpful for having an outlet to share thoughts, problem solving, and establishing a sense of community. Additionally, being unable to see family and friends due to COVID-19 was also noted as a significant challenge, regardless of learning style.

'My support is always in the shape of, or in the form of people that I talk to. It's always conversations. I'm very close to my parents and fortunate that they're very, they're always available. And yeah, just a bunch of good friends. I really, really do value, umm, the friendships that I have' [P13-Y2-A]

'I like to be around people and I like, I sort of need the social aspect of things and more than I like to admit, because I think beforehand, I'd like to pride myself on being independent and working on my own, and sort of spending more time on my own and being okay with that. And I think in this time, I've realised how much I miss the daily interactions I have with other people. Even if it's not spending a big chunk of time with someone else, I missed having the every day, sort of just conversations that you have as you walk by or you see someone.' [P12-Y1-AC]

While social connection was cited as important by all students, the quality and nature of social connection may differ for Assimilators and Convergents. For Assimilators, fewer but deeper interpersonal relationships may be important for resilience, while for Convergents a larger number of less intense relationships may be valuable. Further, Convergents may be more comfortable with on-line or social media centred relationships whereas Assimilators may benefit from more direct unmediated forms of communication. Recognising that 'social connection' means different things to different learning styles is essential. The social distancing and lockdown conditions associated with the pandemic may be particularly difficult for Assimilators given their preferences for live, deep, interpersonal connections. While social media can be helpful in this context, it may not replace it, depriving Assimilators of an important resilience-building activity.

Journaling and mindfulness/meditation

The resilience literature frequently highlights the potential value of two specific tactics: journaling and mindfulness/meditation. While the impact of these strategies to support resilience during the pandemic has not been assessed, this study suggests that few Assimilators or Convergents used either of these strategies in a deliberate way.

One Converger discussed use of an agenda for productivity (rather than resilience) purposes:

'I also keep a diary, but it's not as supportive as it is logistical [laughs]. ... 'it keeps me organised and it lets me get things done. But, you know, the diary isn't something like I rant into and feel better.' [P5-Y3-C]

The few Assimilators who described using journaling as a resilience strategy were ambivalent about its value:

'I think I do have a lot of like thoughts in my mind throughout the day. I think writing that on paper will really help. It's just, I think I'm afraid to write my thoughts down because then it becomes real.' [P8-Y3-A]

'I used to do it every day, but ever since I've gone to university, I just didn't have time so I do it like, twice a year, or whenever I have time, but when I do do the journaling, it's like pages, and I just unload like a whole year of updates into it. So it helps me kind of self-reflect in a sense, and sometimes like when I read my old entries, like I can kind of see like how far I've come in a sense and like what I've accomplished. So I think that's a good aspect of it like it keeps me motivated to go forward.' [P16-Y3-A]

Results from this study call into question the utility of journaling – one of the most widely cited resilience strategies in the literature. Further research is required to determine whether students have simply never tried journaling, or if students have been unsatisfied with the value of journaling as a resilience-building strategy, after they have tried it.

Similarly, despite its popularity in the resilience literature, few participants in this study had used mindfulness or meditation practices; those who had tried this described it as 'unhelpful' or 'not very useful' in slowing racing thoughts:

'I think it's really hard for me sometimes, because I can't turn my brain off. Even though you're, you're like forcing yourself to be mindful of your thoughts and just letting them pass. But then sometimes I focus on them too much. And then I, I've tried like guided meditation on apps. Sometimes it's just like the entire meditation will be over and I just focused on one thought, that kept popping in my head and I was like, wow, that's such a waste of time.' [P8-Y3-A]

'This one time when I was really stressed, I tried to listen to those meditation YouTube videos... I just couldn't relax. Like, they're just talking so slow and I'm like, oh my god, can you hurry up? Like, what do you, what do you want me to do? Like just tell me!' [P16-Y3-A]

Among those that mentioned mindfulness/meditation activities were helpful, they often took the form of breathing activities, exercise, and prayer rather than participating in traditional meditation or mindfulness practices.

'When you're running kind of you want to get your mind off of like running and actually think about like other things. So it's a good way to think about like, choices that you made and kind of things that you're in right now. It's a good way to think about you like problems that your rotation gives you too. Like my rotation's giving me problems, I'm like, okay, brainstorm this, I'm like, Okay, I gotta go for a run.' [P21-Y3-C]

'With the breathing, I find that it helps me feel present in the moment as well as feel a certain rhythm that I could carry into my day and sort of feel at peace and at ease and, because before then, I felt often either rushed or just frantic to get up and get going with my day. And I feel like the breathing is really helped there' [P12-Y1-AC]

This study suggests there may be an important gap between the resilience literature (which highlights value of and success with journaling, mindfulness and meditation) and the experiences of students during times of high stress. Results from this study do not indicate whether students have actually tried – and were dissatisfied – with these techniques, or whether they are unaware of them and simply have never used them. Nonetheless the gap between the literature and lived experiences of students suggests further work in this area is necessary.

Psychotherapy and counselling

Therapy and/or counselling services were not commonly utilised amongst the study population. No Convergers in this study reported accessing psychotherapeutic services, potentially due to a preferred self-reliance in solving their own problems and navigating difficult or stressful situations despite expressing openness to this modality in the event of a crisis:

'I feel like I haven't been to that to the point where I would need [therapy]. But like, I feel like I have a pretty good support system with my friends and family. So thankfully, I haven't had to like explore anything new. But

I would feel that would definitely help if I needed it, to have like a counselor or something like that.'

[P7-Y2-C]

Assimilators in this study expressed mixed opinions on the role of psychotherapy as a resilience-enhancing activity:

'I now have kind of figured out what will prevent me from like really, like panicking when it comes to school is like, I'm going to be in communication with my doctor or like a counselor if I do find that it's starting to come back, like those feelings of anxiety or panic because like, you know, your doctor isn't necessarily just there for when things go wrong but like it's more of a preventive measure for myself.' [P20-Y2-A]

'I tried speaking to a therapist/counselor, and she told me I was too self-aware for her to help me. I think it's now it's gotten to this point where it's like, very similar. Where everything like the therapist will tell me I'll be like, yeah, I already know that. Um, so it's either I have to find another therapist that will understand me better, or I just have to figure out ways to cope on my own.'

[P8-Y3-A]

Participating pharmacy students in this study did not express need for psychotherapy services to enhance personal resilience. However, it is possible this resilience strategy is underrepresented considering discussions regarding therapy-seeking may be more sensitive in nature than other resilience strategies assessed in this study, and therefore it is possible some students may have withheld relevant information from their peer- interviewer. Of those who did share experiences with therapy, there appeared to be benefit for students who feel they cannot cope on their own irrespective of learning style. Indeed, research has demonstrated that in order to improve student mental health and foster a supportive professional school environment, mental health services and resources including counselling services should be well advertised, readily available, and accessible to students in need (Kitzrow, 2003; Eisenberg, Hunt, & Speer, 2012).

Limitations

While this study aimed to better understand relationships between learning styles and personal resilience strategies, some limitations must be considered. As this study is qualitative and exploratory in nature, our sample size is relatively small and consequently more data is needed to rein-

force and support findings reported here. Notably, we were not able to recruit a sufficient number of Accommodators or Divergers for this study, which is a reflection of the predominance of Convergents and Assimilators in most pharmacy programs across North America (Crawford, Alhreish, & Popovich, 2012; Robles, Cox, & Seifert, 2012; Loewen & Jelescu-Bodos, 2013). Additionally, the time commitment and one-on-one nature of this study may have acted as a further barrier to participation. It is also worth considering that learning styles are not static, and may evolve over time as individuals grow (Austin, 2003). A potentially insightful follow-up study may be to investigate how individual fluctuations in learning styles impact personal resilience strategies. Based on preliminary findings from this exploratory study, a survey or more quantitatively oriented study design may be useful in the future to enhance sample size limitations and to provide additional data upon which to base analyses.

Another limitation of this study includes the participant-observer nature of the study. Participant-observer research may be beneficial in the sense that the interviewer may easily relate to the participant, and therefore will be able to ask more pointed and specific probing questions as a consequence of belonging to the same population as the participant (Patton, 2002). As a result, some participants may feel inclined to hold back sensitive information during the interview due to the lack of anonymity between the interviewer and participant.

Finally, the same protocol questions were asked to each subject to help ensure consistency between participants, and that no intentionally leading questions would be asked based on preconceived suppositions regarding dominant learning style. However, despite risk of bias associated with administering specific protocols for each learning style, this method may have uncovered additional differences in resilience strategies between learning styles that were not revealed during this study. Importantly, learning style are simply one component of the complex amalgam that is the human personality; while learning style differences were the focus of this study, caution must be taken to not overstate its importance in the context of other personality or trait-psychology factors.

Despite these limitations, this research is exploratory and is intended to help broaden our understanding of a novel research area in order to inform future areas of research. Although this study is focused on resilience strategies in Assimilator and Converger dominant pharmacy students through the lens of the COVID-19 pandemic, future research should seek to further integrate Accommodator and Diverger data in order to gain a broader understand-

ing of the relationship between learning styles and resilience.

Conclusion

Resilience is a fundamental aspect of ensuring the success of pharmacy students throughout their education and professional careers. Although this study was performed in a highly specific time period that is not representative of typical day-to-day life of pharmacy students, our findings represent an opportunity to refine resilience messaging and services at the faculty level. Rather than providing one-size-fits-all advice and programming to pharmacy students, there may be potential to improve resilience by incorporating tailored and specific strategies based on the dominant learning style of each individual student.

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Appendix A: Brief overview of learning styles (Kolb, 1985; Austin, 2003)

Appendix B: Semi-structured Interview Protocol

| | |
|--------------|---|
| Accommodator | Accommodators learn best from hands on experience. They make decisions quickly and decisively, value time efficiency and completing tasks expediently. |
| Assimilator | Assimilators tend to focus less on individual needs and more on ideas, concepts and logical arguments. They tend to enjoy analytical work and having time to think things through rather than be put on the spot. |
| Converger | Convergers demonstrate a preference for practical uses for ideas. They work well in time-pressured situations where problems must be solved and decisions must be made. Convergers tend to prefer to lead, rather than follow, and may prefer dealing with technical tasks and problems rather than social or interpersonal issues. |
| Diverger | Divergers tend to view situations from multiple perspectives. Their bias is towards observation, rather than action. They tend to enjoy brainstorming and idea generation, and value harmony, listening with an open mind and giving and receiving personal feedback. |

1. As a student who will be soon entering the workforce as a pharmacist, can you tell me a little bit about your sentiment towards the profession of pharmacy as a whole?
 - b. Follow-up: Do you feel your impression of the profession has changed over the past few months since the pandemic has started?
 - c. Follow-up: If yes, how has it changed? What caused this change?
2. In general, how do you feel about the future of the pharmacy profession?
 - a. Follow-up: What role do you envision for yourself within the profession in the future?
3. Thinking back to your experiences over the past 2-3 months since the lockdown started;
 - a. Year 1-3 only: How did you feel when you learned classes were being moved online?
 - b. Year 1-3 only: How did you feel when you learned exams were being moved online?
 - c. How did you feel when rotations were cancelled (year 1,2,4) / were moved online (year 3)
 - d. Year 4 only: How did you feel when convocation / graduation ceremonies were cancelled?
 - e. Year 4 only: How did you feel when licensing exams were cancelled?
 - f. How have you been feeling now that we have settled in to the summer semester?
4. Can you think of any particular event or experience over the last few months that was most difficult for you?
 - a. Prompt: Can you tell me about it?
 - b. Follow-Up: What did you do to manage/cope with the situation?
 - c. Follow-Up: How do you think these techniques/coping strategies have worked for you? Do you feel these strategies are effective?
 - d. Follow-up: Is there anything that you found didn't work well in your approach to handling this situation? Are there any strategies you have tried that didn't work well?
 - e. Follow-up: Are there any support systems you may have turned to over the last 8 weeks or are you more independent in your approach?
 - f. Follow-up: Is there anything that could have helped you better navigate this situation in retrospect?
 - g. Follow-up: Is there anything you've learned about yourself after going through this situation?
5. Do you have any other thoughts or comments regarding anything we've spoken about today that you'd like to share?