

OBSERVATIONS

Introversion and Medical Student Education: Challenges for Both Students and Educators

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Issue: Introversion is one of the personality factors that has been shown to be associated with performance in medical school. Prior cross-sectional studies highlight performance evaluation differences between introverted and extraverted medical students, though the mechanisms and implications of these differences remain relatively unexplained and understudied. This gap in the literature has become more salient as medical schools are employing more interactive learning strategies into their curricula which may disproportionately challenge introverted learners. **Evidence:** In this article, we provide an overview and working definition of introversion as a valid construct occurring on a continuum. We apply a goodness of fit model to explore how various medical training contexts may be more or less challenging for introverted students and the potential consequences of a poor fit. As preliminary support for these hypothesized challenges, we share observations from students self-identified as introverts. Examples include introverted students feeling at times like misfits, questioning a need to change their identity to succeed in medical school, and being judged as underperformers. We offer pragmatic suggestions for improving the fit between introverted students and their training contexts, such as teachers and students pausing between a question being asked and the initial response being offered and teachers differentiating between anxious and introverted behaviors. We conclude with suggested areas for future qualitative and quantitative research to examine how medical school curricula and the teaching environment may be differentially impacting the learning and health of introverted and extraverted students. **Implications:** Extraverted behaviors will continue to be an important part of medical training and practice, but the merits of introverted behaviors warrant further consideration as both medical training and practice evolve. Educators who make manageable adjustments to current teaching practices can improve the learning for both introverted and extraverted styles of academic engagement.

Keywords personality, student characteristics, assessment, student health, qualitative

INTRODUCTION

Introversion is one of the personality factors that has been associated with performance in medical school.¹ The direction of the association has been contextually dependent with introverted students having higher academic success in the 1st year,² lower evaluations related to interpersonal behavior in clerkship years,³ and higher stress levels overall than their extraverted peers.^{4,5} Although these studies inform us that introverted and extraverted medical students perform and respond differently, we know little about the learning environment's influence on introverted students' thoughts, emotions, actions, or well-being. Examining this gap in our understanding is particularly salient in medical education today, in part as a response to the Liaison Committee on Medical Education's standard on active learning (ED-5-A),^{6,7} causing medical schools to shift toward more interactive teaching strategies (e.g., case-based discussions, problem- and team-based learning) and group learning venues (e.g., study table in pods, more open design libraries). We address this important issue by providing an overview and working definition of introversion and examine how various medical training contexts may be more or less challenging for introverted students. As part of this examination, we share student observations as preliminary support of these hypothesized challenges. We conclude with pragmatic suggestions for improving the fit between introverted students and their training contexts and note areas for future research.

INTROVERSION: A BRIEF REVIEW AND WORKING DEFINITION

Our understanding of introversion has evolved over the last century, but certain characteristics of this style have remained relatively consistent. In 1923, Carl Jung first described

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introversion as the extent to which one exhibits more self-reflective introspection and less outgoing social behaviors.^{8,9} He suggested that introversion and extraversion characteristics exist within all individuals, with one characteristic being more dominant. In the following decade, Myers and Briggs, developers of the widely popular Myers-Brigg Type Indicator (MBTI)^{10,11} described introverts as inward turning and thought oriented, enjoying specific deep personal relationships, and feeling recharged from time alone and extraverts as outward-turning, action-oriented, socially drawn individuals who recharge after spending time with others.¹² They estimated that 25% to 50% of the population was introverted depending on the sample drawn.¹³

Although studies of construct validity and reliability¹⁴⁻¹⁷ and cultural consistency^{18,19} provide support for introversion as a definable construct, the psychometric properties of the MBTI have been questioned. Pittenger stressed caution in over-interpretation of the discrete (or bimodal) classification of introversion/extraversion.²⁰ Instead he conceptualized introversion/extraversion not as a bimodal distribution in a trait-type manner but rather as the expression of continuums that individuals possess for introverted and extraverted characteristics, albeit often tending toward favoring one. Girelli and Stake were also critical of the bipolarity assumptions of the MBTI, attributing this to the forced choice nature of item presentation.²¹ When substituting a Likert scale for addressing items, they found that bipolarity support fell off for the all of the MBTI dimensions except the Introversion and Extraversion scales, which retained a significant inverse correlation and minimal shared variance.

In the 1980s and '90s, the five factor model of personality was developed by employing psychometric analysis of dozens of existing personality measures instead of on the basis of a given theory. In this model, Extraversion is one of the five basic tendencies that drive our personalities along with Neuroticism, Openness, Agreeableness, and Conscientiousness. Introversion is seen as being less sociable and less gregarious (e.g., decreased talkativeness, lowered emotional expressiveness) and less assertive.^{22,23}

Research into the biological underpinnings of introversion/extraversion provides us with insights to associated behavioral tendencies. Eysenck noted that extraverts seek excitement and social stimulation as a way of increasing their arousal level, whereas introverts minimize social contact in an effort to tone down such arousal.²⁴ Kagan and Snidman's work on temperament and reactivity, particularly in the amygdala, supports the hypothesis that individuals with higher sensitivity to their environment (i.e., low amygdala threshold for stimulation) regulate their reactivity by introverted behaviors (i.e., shy, reflective, anxious, and timid), whereas individuals with higher amygdala thresholds (i.e., lower perception of environmental threat) and a lower sensitivity to stimulation are more likely to exhibit behaviors associated with extraversion (i.e., outgoing, exploratory, and risk taking).²⁵

How well an individual's preferred behaviors and his or her environment match up produces expressions of behavior ranging from maladaptive to optimal, as illustrated in Figure 1. For example, a physician investing hours of study to understand a complex clinical case is an optimal match between behavior and environmental demand. However, the same physician investing hours with a more routine presentation would be ineffective in his or her practice. Environment is used here to refer not only to the immediate physical space but also to the broader cultural norms that inform expected role performance and/or world views. A congruent fit between environmental demands and one's temperament and behavioral style typically results in optimal performance while a poor fit can result in maladaptive behavior.²⁶ When there is less goodness of fit, individuals often seek to rebalance or recharge themselves via restorative niches.²⁷ In other words, those tending toward extraversion seem to recharge from exposure to active involvement in socially stimulating situations, whereas those tending toward introversion do the same from exposure to more subdued, less socially demanding situations.

Individuals who exhibit only extreme introverted or extraverted behaviors tend to struggle in environments that demand other behaviors (e.g., extravert failing to enlist treatment team input before initiating plan; introvert failing to share alternative differential). However, in our current Western culture there appears to be greater acceptance for extreme extraverted behaviors and more negative judgment for extreme introverted behaviors. Among descriptions of these two tendencies, there is an increasingly negative tone of language associated with introversion.²⁸ Whereas Jung noted heightened reflection, Adler, an early personality theorist, has often been interpreted as equating introverts as isolative, withdrawn, and marked by feelings of inferiority.²⁹ Grimes compared extreme expressions of introversion to autism spectrum behaviors.³⁰ This trend of devaluing or pathologizing introverted behavior has been noted in national studies^{31,32} and is emphasized in Susan Cain's best-selling book on introversion that Western society has shifted from appreciating a thoughtful approach of interaction with others to a more demonstrative social and assertive approach.³³

From our review of the introversion literature, we draw these conclusions. First, reduced sociability and increased reflective thinking style are common elements of introversion across the research. Second, introverts tend to seek less stimulation from the external world, whereas extraverts tend to thrive or even "live" there. The biological research on reactivity and temperament is informative in this area. Third, how well a person is adapting to his or her world depends on the goodness of fit between preferred style (basic tendencies) and the demand of the external world and culture. In cases with a poor goodness of fit, it is important to have "restorative niches" or opportunities for congruence of style and demands to realign. Fourth, either extremes of the introversion/extraversion continuum can have maladaptive implications when other behaviors are warranted.

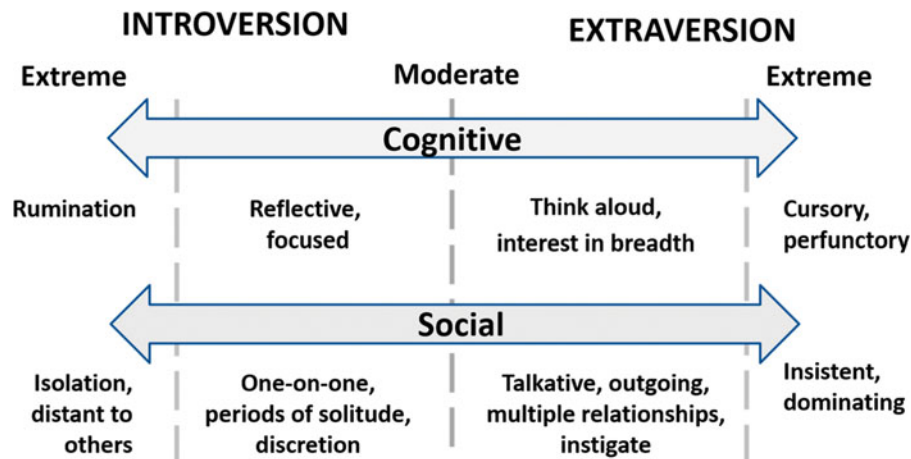


FIG. 1. The continuum of introversion and extraversion across cognitive and social domains.

However, the negative aspects of extreme extraversion are more tolerated in Western society than extremes in introversion.

MEDICAL EDUCATION CONTEXTS: FROM THE PERSPECTIVE OF INTROVERTED LEARNERS

Based on the temperament and biological research, we have established that individuals' environment and culture, as well as biological nature, play major roles in their actions, decisions, and well-being. In this section, we apply these concepts toward the medical training context and consider how the learning environment may impact introverted students differently.

Medical education utilizes a wide array of educational contexts ranging from didactic lectures and discussion groups in the preclinical years to team rounds and one-on-one precepting in the clinical years. We hypothesize that introverted students will find certain teaching settings more challenging than will extraverted students; these settings include group discussions with more than a few learners, settings where forming quick relationships with team members is expected, and settings where ideas need to be offered quickly or assertively. In Table 1, we have listed common medical teaching settings and the associated student roles for each. We then considered how well a student's introverted or extraverted style may fit with the expected role.

COMMON EXPERIENCES OF INTROVERTED MEDICAL STUDENTS

Introverted students are aware of how their preferred thinking and interaction styles can be at odds with their training contexts. This is particularly evident in small discussion group settings. The authors collectively have years of group facilitation experience and have heard students express frustrations and concerns during feedback sessions. Some themes we have noted include introverted students feeling like misfits, being afraid of being wrong or misunderstood, struggling to get a word into conversation, experiencing frustration with expectation to talk more,

desiring more time to reflect before responding, having strong need for downtime to recenter after active social encounters, feeling a need to change their identities to succeed in medical school, and being judged as underperformers. Recently, the authors shared with their small group students a link to Susan Cain's TED Talks video on introversion.³⁵ Several students expressed relief and validation after viewing this brief video, which "normalizes" an introverted orientation. Such reactions provide further impetus to examine this phenomenon and to find options for minimizing its impact on their learning and demystifying an introverted approach to learning. Next is a set of amended comments the authors received from their students regarding introversion:

- I have always been the quiet keep-to-myself type and thought most clearly when there were fewer outside stimuli intruding on my thoughts but I learned to talk a lot and joke about things because that is what makes people feel comfortable.
- One of the issues that people may have with introverts in general is that they just don't know what's going on with them. I know more than a few people who have said that I was intimidating or seemed standoffish, just because I didn't talk much. Just because we aren't constantly talking and letting everyone know everything that's going on inside our heads we come across as the weird ones.
- If extraverts are able to reduce their tendency to lead the group, there will be more freedom and room for introverts to also contribute their unique thoughts without having a predilection from an established group-think/conformity.
- After reading Dale Carnegie's book on how to influence people, I felt the writer was telling me that I would have to change my personality/identity in order to make positive changes in other people's lives.

TABLE 1

Hypothesized goodness of fit between the student roles in various medical training contexts and introversion/extraversion style

Training Context and Student Role(s)	Goodness of Fit Between Style and Role ^{a,b}	
	Introvert	Extravert
Didactic lecture: Active listening, take notes	High Thoughtful notes	Medium Losing interest or focus
Anatomy lab: Dissect cadaver; identify body organs and systems	High Attention to detail	Medium Works well in teams
History and physical diagnosis: Practice interviewing and examination skills with peers and patients	Medium Active listening with patients	Medium Greater ease initiating conversations; narrowing diagnostic differential prematurely
Discussion group (less structured): Share thoughts on readings, issues	Low More likely to listen than contribute	High Willing to initiate conversations and assert opinions
Case-based group (more structured): (e.g., PBL) Think aloud; present learning objective	Low Likely to listen carefully, but not verbally participate unless called upon	High Likely to participate; may “speak before thinking”
Group project: Multiroles such as brainstorm, plan, research, synthesize, document, present	Varies; high to low Good listening skills; able to adopt and offer different perspectives; may withdraw or not provide input if not sought out	High Assume leader role; may be less aware of less active peers; may compete with others for space/attention
Clerkship presentation: (e.g., morning report) Present, think aloud	Medium Less comfortable taking lead in presenting; more likely to have considered various aspects of case	Medium Less likely to have considered details or case as a whole before speaking
Case discussions: (e.g., “table rounds”) Think aloud	Low Seeking more information to raise certainty	High Willing to offer explanation with less available information
Bedside hospital rounds (as group): Observe, shadow, inquire, explain	Low May tend to stay in the background, try to avoid being called out	High More comfortable with responding without all the information; may inadvertently suppress input from others in the group
One-on-one with clinic preceptor: Observe, shadow, inquire, explain	High-Medium May thrive in a respectful relationship that recognizes strengths/weaknesses	Medium May thrive in a respectful relationship that recognizes strengths/weaknesses

^aOur goodness of fit comments are consistent with NEO-PI-R facets of the extraversion /introversion construct which include warmth, gregariousness, assertiveness, activity, excitement seeking, and positive emotion.³⁴

^b“High” goodness of fit indicates substantial overlap between individual’s skills/preferred style and environmental demands/expectations; “Medium” indicates likely areas of strengths and challenges; “Low” indicates significant mismatch between skills/style and environmental demands/expectations.

IMPLICATIONS FOR MEDICAL EDUCATION AND MEDICAL EDUCATION RESEARCH

Several important implications for medical education and medical education research exist. First, although there have been studies completed in medical education demonstrating associations between personality factors and academic performance,¹

no studies have examined the qualitative experience of introverted students and the challenges faced between preferred style of thinking and interacting and environmental demands. Stated differently, defining success in medical school based solely on graduation rate or residency placement likely misses a whole host of issues that more introverted students may encounter.

These might include professional identity development, specialty selection, differences in advising, teamwork, and critical thinking. As a starting point, focus groups with students identified as introverts (self-identified or based on validated introversion scales) have the potential to yield insights concerning their fit into our existing models of instruction. A second area warranting examination is the overall health, both physical and mental, of introverted versus extraverted students. As noted earlier in the review of goodness of fit literature, if introverted students perceive medical school training as incongruent or invalidating of their preferred thinking and social style, they are more likely to experience stress, which if chronic has been associated with an increase in physical and mental health symptoms.³⁶

A third area warranting investigation is the potential bias of evaluation methods toward extraversion tendencies. Given that many small-group and clerkship evaluation forms list behaviors that are more easily recognized with extraverted learners (e.g., *willing to initiate discussion, takes lead in group, participates in session*), introverted learners may be disadvantaged in these evaluations. In contrast, if forms included items such as *thinks before speaks, offers a synthesis of the information, listens to peers before engaging*, the overall evaluation scores of introverts might increase, but areas of problematic behavior for extraverts might also be identified. Other areas to examine include written evaluation comments, letters of recommendation, and residency interviews.

Finally, medical educators often cite students' critical thinking and independent evaluation of information as skills that need further development. A comparison study is warranted to examine whether the reflective cognitive style of introverts is better suited for critical evaluation. If differences are noted, there could be training implications on how introverts and extraverts might be taught differently to develop this skill.

STRATEGIES TO OPTIMIZE LEARNING FOR INTROVERTED (AND EXTRAVERTED) STUDENTS

Despite the challenges just noted for introverts, educators can employ some simple strategies to foster the learning of their introverts without the need to revamp curriculums or settings. In settings where a student is likely to be asked to comment, providing advance notice of the expectation provides introverts with an opportunity to consider their responses. For example, *In our next group discussion, I will be asking each of you to comment on how the readings compare to your clinical experiences*. Online teaching is another modality where introverts may flourish. Asynchronous discussion boards or e-mail exchanges provide learners with time to form thoughts, consider information and offer appropriate responses.

When more spontaneous responses are necessary, a 5- to 10-second pause after asking a question may be sufficient time for introverts to prepare and also for extraverts to analyze (and possibly modify) their initial responses. In problem-based learning discussions, a pause after reading a line would dramatically increase the likelihood that an introvert offers initial comment. In

discussion groups with several students, having breakout subgroups discuss issues first and then meet as a whole group increases the likelihood of participation by all learners.³⁷ Related, addressing problems exhibited by overly extraverted students also improves learning environments for all students. If a student tends to jump in repeatedly before peers or fails to consider options before recommending a plan of action, then prompting that student to ponder longer and to work within his or her team enhances all of the students' learning. Educators may also consider expanding their students' skills in active listening, reflection, and mindfulness; training in these skills may complement schools with existing courses that emphasize extraverted behaviors such as public speaking. Enabling students to shift across introverted and extraverted behaviors based on demands of setting increases their ability to adapt.

Another setting where pausing can be useful is during the time-honored medical tradition of "pimping,"³⁸ where a series of challenging questions is typically posed by senior team members to junior members with the expectation of immediate responses. In all of these teaching settings, reflective, introverted students may still be pondering the question and a range of responses and feel shut out by the rapid responses of their more extraverted peers. Hence, preceptors and attendings adopting pimping or a more rapid response style of teaching may underestimate the engagement, knowledge, and potential of their introverted students who likely fare less well in these interactions.

A final recommendation for teachers is to distinguish between anxious and introverted behavior. Although there is likely some overlap in the sources of these behaviors (e.g., reactivity),^{39,40} introverted individuals enjoy personal interactions and are able to stay focused on an issue at hand. In contrast, anxious individuals worry about future events or places, have concerns with coping in various settings, and tend to be avoidant. Interventions such as increased exposure or cognitive restructuring are useful for anxious individuals to better adapt to their environment (e.g., practice speaking in public when there is a fear of saying the wrong thing),⁴¹ but these same interventions for nonanxious introverts are not relevant and can be counterproductive (e.g., invalidating introverted students' perspectives of the world; placing demands on students to practice unnecessary coping behaviors).

CONCLUSION

As medical education has incorporated more interactive and "thinking aloud" models of training, there is a growing need to examine the likely differential impact of this trend on introverted learners and their education. Qualitative and comparison studies are warranted to examine if introverted individuals who prefer activities that are more reflective, less socially engaging, and requiring lower levels of assertiveness perceive medical training and progress differently than their extraverted peers. Initial areas of study might include well-being, stress and health of introverted students compared to their peers, impact of amended

evaluation forms that include behaviors common to introverted and extraverted students, and differences in professional identity development including advising and specialty selection.

Self-observations offered by self-described introverted students provide initial support that these students do experience a “misfit” with many of the expectations and interactions in medical training. Although the implications for student health and educational progress are considerable, there are manageable adjustments to current teaching practices that can address these differences and potentially improve learning for both introverted and extraverted styles of academic engagement. Extraverted behaviors will continue to be an important part of medical training and practice, but the merits of introverted behaviors warrant further consideration as both medical training and practice evolve.

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